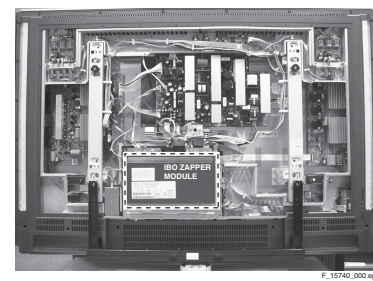


Service Service Service

FTP2.4E AB

Supplement to manual FTP2.4E AA 3122 785 15460



F_15740_000-005
121005

Service Manual

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1. Technical Specifications, Connections, and Chassis Overview

Introduction:

- This manual is a supplement to the FTP2.4E_AA manual (3122 785 15460), and therefore only gives the additional IBO Zapper information.
- Figures can deviate due to the different set executions.

1.1 Connections

Note: The following connector colour abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, and Ye= Yellow.

1.1.1 Rear Connections

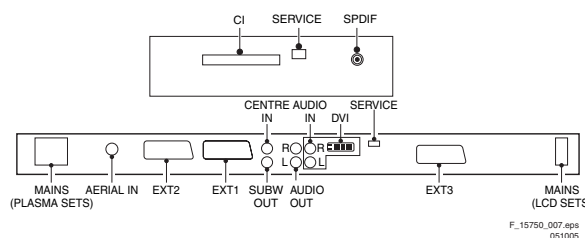


Figure 1-1 Rear connections

CI Common Interface: PCMCIA

68p - See diagram K7



Service Connector (UART)

- | | | |
|---|-----------|----------|
| 1 | - UART_TX | Transmit |
| 2 | - Ground | Gnd |
| 3 | - UART_RX | Receive |



DIGITAL AUDIO Cinch: S/PDIF - Out

Bk - Coaxial 0.2 - 0.6 V_{PP} / 75 ohm



1.2 Chassis Overview

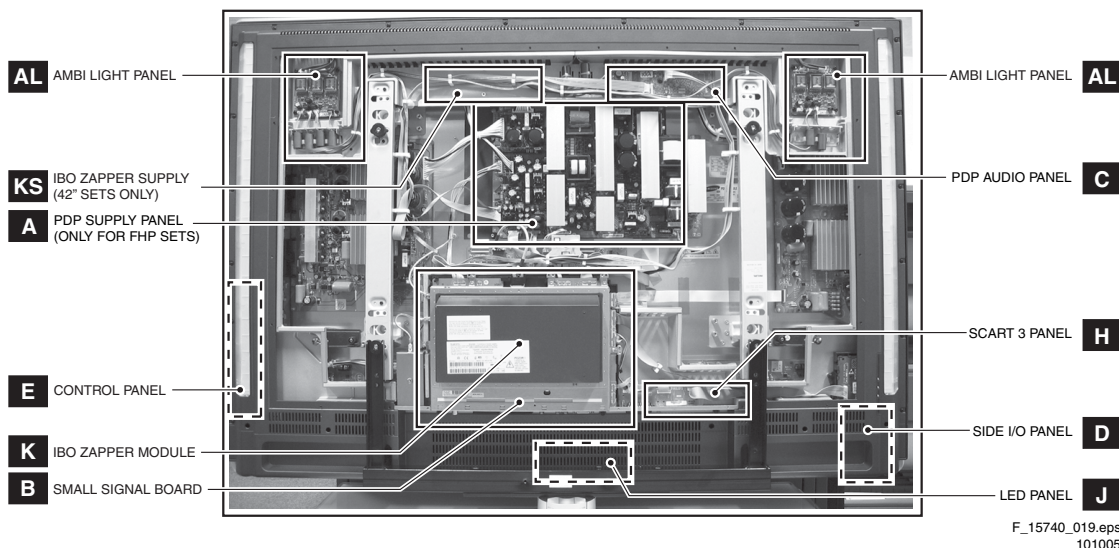


Figure 1-2 PWB location (photo from 50" SDI model)

2. Safety Instructions, Warnings, and Notes

See Service Manual FTP2.4E_AA (3122 785 15460).

3. Directions for Use

You can download this information from the following websites:

<http://www.philips.com/support>

<http://www.p4c.philips.com>

4. Mechanical Instructions

Index of this chapter:

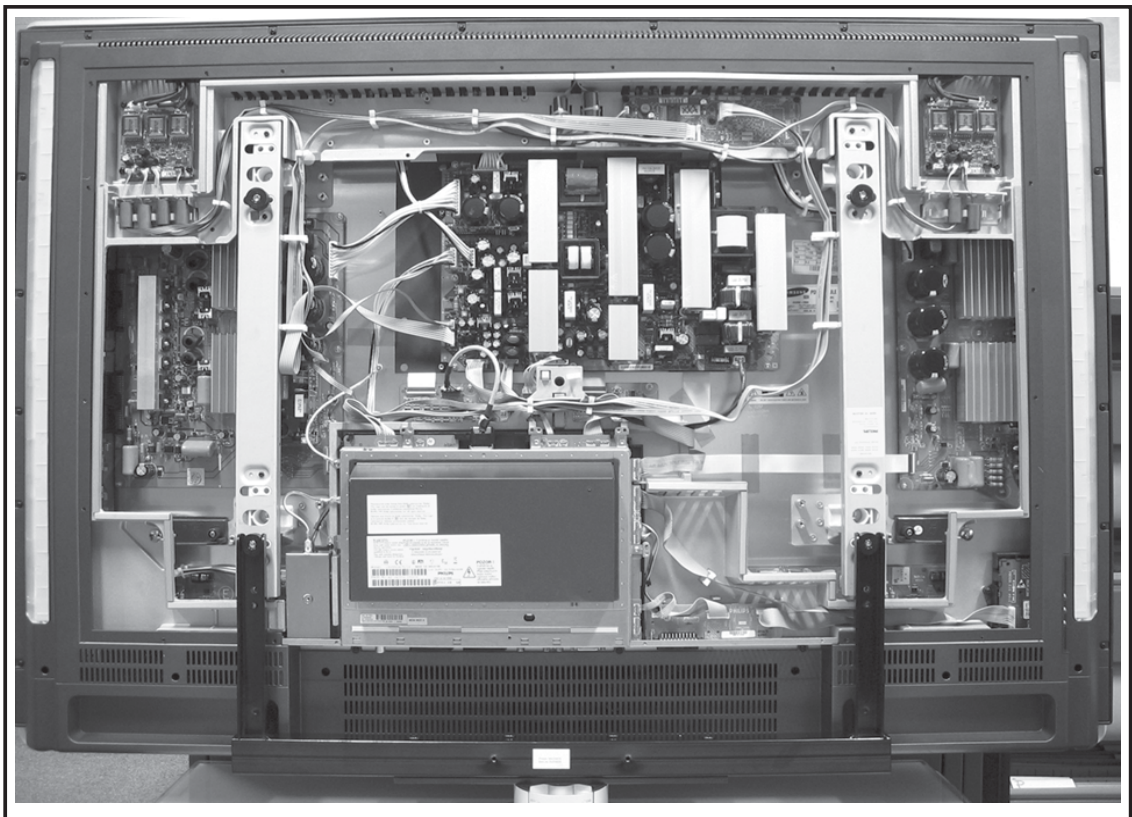
- 4.1 Cable Dressing
- 4.2 Assy/PWB Removal

Notes:

- Figures below can deviate slightly from the actual situation, due to the different set executions.
- Follow the disassemble instructions in described order.
- All photo's are made of the 50" SDI model, however the 42" model will not deviate much from it.
- Follow the disassemble instructions in described order.
- Be aware that the internal (gold coloured) frame is made of conducting material. So, be cautious during electrical measurements!

4.1 Cable Dressing

4.1.1 Chassis

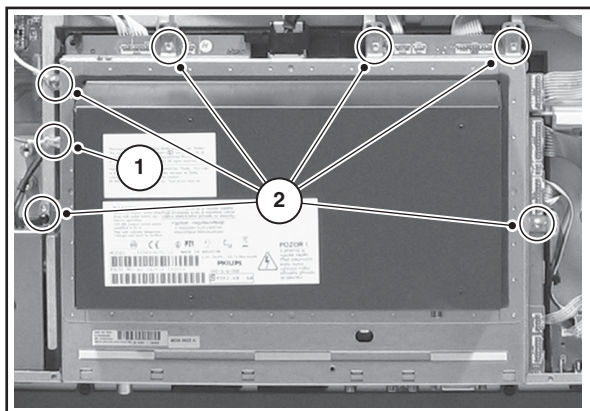


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101005

Figure 4-1 Chassis cable dressing

4.2 Assy/PWB Removal

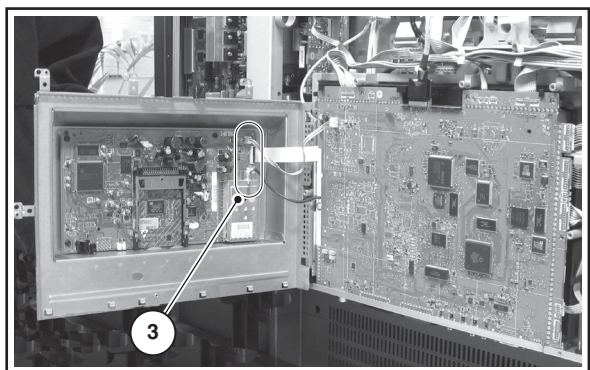
4.2.1 IBO Zapper Module



F_15740_021.eps
101005

Figure 4-2 IBO Zapper module

1. Disconnect the earth cable [1] from the earth connector on the IBO Zapper module.
2. Remove the 6 torx screws [2] and remove the shield by carefully turning it to the left (see figure "Disconnect IBO Zapper module").

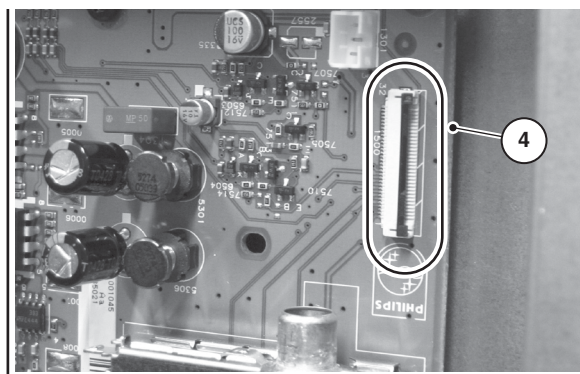


F_15740_022.eps
101005

Figure 4-3 Disconnect IBO zapper module

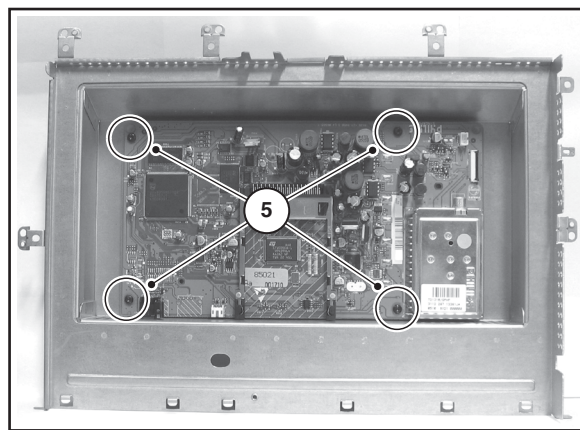
Note: See figures "Disconnect IBO Zapper module" and "Connector 1500".

1. Disconnect the flat cable [3] from connector 1500 on the IBO zapper module by lifting the black cable clamp and pulling out the flat cable. For re-connection afterwards, lift the black cable clamp of this connector [4] and put the flat cable back in. Push down the black cable clamp of connector 1500 after the flat cable is plugged in.
2. Disconnect white connector (1301).
3. Disconnect the antenna cable [3] from the tuner on the IBO Zapper module.



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101005

Figure 4-4 Connector 1500

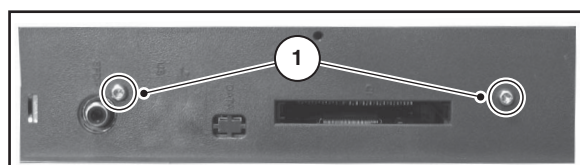


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101005

Figure 4-5 Remove IBO zapper module

1. Remove the torx screws [5] and remove the IBO zapper module from its metal case.

4.2.2 IBO Zapper Module Front Panel



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300505

Figure 4-6 IBO zapper module front panel

1. Remove the two screws [1].
2. Remove the front panel by shifting it sideways to unlock it.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

- 5.1 Service Modes IBO Zapper Module
- 5.2 Error Codes IBO Zapper Module

5.1 Service Modes IBO Zapper Module

5.1.1 Digital Customer Service Mode (DCSM)

Purpose

The DCSM is only available in “digital” mode, so enter this mode with the “A/D” button on the Remote Control. This mode shows information on the IBO Zapper module settings, and helps the call centre to diagnose problems and failures in the IBO Zapper module before making a service call. The DCSM is a read only mode, therefore, modifications in this mode are not possible.

How to Activate DCSM

Use the following method:

1. Press the “Digital” menu button on the Remote Control to activate the digital user menu (“Setup”).
2. Activate the “Information” sub menu (select “Information” via the “DOWN” and “UP” cursor buttons and then activate the menu by pressing cursor “RIGHT”).
3. In the “Information” sub menu, press the following buttons on the RC to activate the DCSM: “GREEN - RED - YELLOW - 9759”. Now, the “Service menu” will appear.

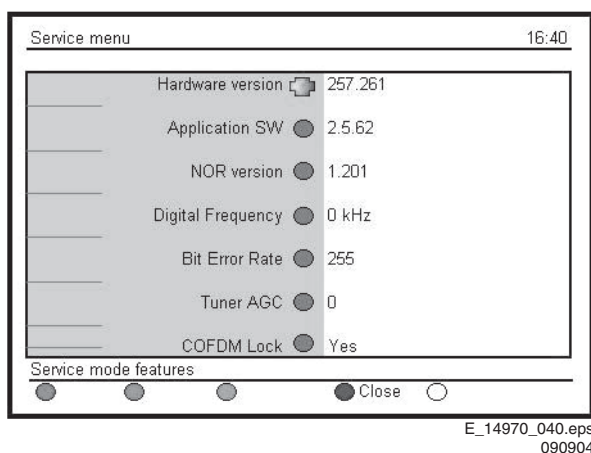


Figure 5-1 DCSM menu (1)

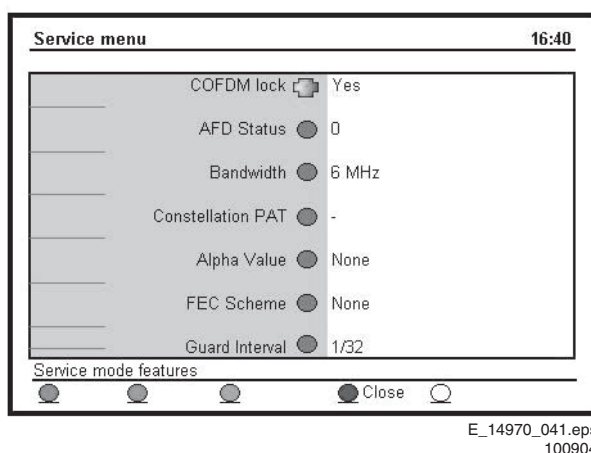


Figure 5-2 DCSM menu (2)

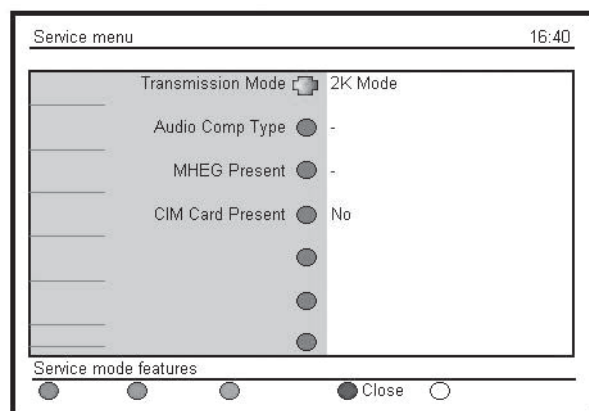


Figure 5-3 DCSM menu (3)

Note: It is not possible to activate DCSM in “analogue” mode (see Customer Service Mode in the paragraph above).

How to Navigate through DCSM

Use the arrow UP/DOWN buttons on the remote control to go to the next or previous DCSM screen (if applicable).

Menu Explanation

- **Hardware version.** This indicates the version of the IBO Zapper module hardware.
- **Application SW.** The application software version.
- **NOR version.** The NOR Flash image version.
- **Digital Frequency.** The digital frequency where the TV is tuned to.
- **Bit Error Rate.** The error rate is measured before the error correction algorithm circuitry. This gives an impression of the signal quality.
- **Tuner AGC.** The tuner AGC value. This gives an indication of the signal strength.
- **COFDM Lock.** Indication if the COFDM decoder is locked.
- **AFD Status.** Status of the Active Picture Format Descriptor (e.g. 4x3, 16x9, ...). This item changes with the aspect ratio.
- **Bandwidth.** The bandwidth of the received signal. Possible values are 6, 7, or 8 MHz.
- **Constellation Pattern.** Displays the signal constellation. Possible values are QPSK, 16-QAM, or 64-QAM.
- **Alpha Value.** Displays the Alpha Value. Possible values are 0, 1, 2, or 4. This value is not used yet.
- **FEC Scheme.** Displays the Forward Error Correcting Scheme. Possible values are 1/2, 2/3, 3/4, 5/6, or 7/8. E.g. 2/3 means that per 2 incoming bits there are 3 outgoing bits.
- **Guard interval.** For digital signals the time that the info is being sent is followed by an empty interval. This is done to cope with reflections in the signal. Possible values are 1/4, 1/8, 1/16, or 1/32.
- **Transmission Mode.** Displays the transmission mode. This is the number of carriers that is used. Possible values are 2k (UK) or 8k (other countries).
- **Audio Comp Type.** Type of detected audio stream.
- **MHEG present.** Indicates if MHEG is present or not.
- **CIM card present.** Indicates if the CIM card is present or not.

How to Exit

Press the BLUE button on the remote control to exit DCSM. The DCSM is a read only mode, therefore, modifications in this mode are not possible.

5.2 Error Codes IBO Zapper Module

5.2.1 Introduction

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from left to right, new errors are logged at the left side, and all other errors shift one position to the right.

When an error has occurred, the error is added to the list of errors, provided the list is not full or the error is a protection error.

When an error occurs and the error buffer is full, then the new error is not added, and the error buffer stays intact (history is maintained), except when the error is a protection error.

To prevent that an occasional error stays in the list forever, the error is removed from the list after 50+ operation hours.

When multiple errors occur (errors occurred within a short time span), there is a high probability that there is some relation between them.

5.2.2 How to Read the Error Buffer

Use one of the following methods:

- On screen via the SAM (only if you have a picture).
Examples:
 - **0 0 0 0**: No errors detected
 - **6 0 0 0**: Error code 6 is the last and only detected error
 - **9 6 0 0**: Error code 6 was first detected and error code 9 is the last detected error
- Via the blinking LED procedure (when you have no picture). See next paragraph.
- Via ComPair.

Note: For more explanation how to read out error codes see chapter "Blinking LED procedure".

5.2.3 How to Clear the Error Buffer

Use one of the following methods:

- By activation of the "RESET ERROR BUFFER" command in the SAM menu.
- With a normal RC, key in sequence "MUTE" followed by "**062599**" and "OK".
- When you transmit the commands "DIAGNOSE" - "99" - "OK" with ComPair (or with a DST).
- If the content of the error buffer has not changed for 50+ hours, it resets automatically.

5.2.4 Error Codes

In case of non-intermittent faults, clear the error buffer before you begin the repair. This to ensure that old error codes are no longer present. Before clearing the buffer, write down the content, as this history can give you significant information. If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error code and not the actual cause (e.g., a fault in the protection detection circuitry can also lead to a protection).

There are various errors:

- I²C device errors.
- I²C bus errors.
- Protection errors.
- Errors not related to an I²C device, but of importance:
 - **FEM (Falconic with Embedded Memory) (Error 26):** at start-up, after initialisation of the PICNIC, the presence of the FEM can be checked.
 - **Eagle (Error 27):** at start-up, after initialisation of the PICNIC, the presence of the Eagle can be checked.

Table 5-1 Error Code Overview

| Error | Device | Description | Def. item | Def. Module indication | Diagr. |
|-------|-----------------------------------|--|-----------|-------------------------------|--------|
| 1 | M24Cxx | NVM, spontaneous blinking error 1 | 7011 | - | B5a |
| 3 | SAA4978 | PICNIC | 7713 | Feature Box | B3a |
| 4 | Supply 5 V | 5V protection | - | +5V Supply | B5a |
| 5 | Supply 8 V | 8V protection | - | +8V Supply | B5a |
| 6 | Slow I ² C bus blocked | Spontaneous blinking error 6 | - | Slow I ² C Blocked | - |
| 7 | Display | PDP error | - | Unknown | - |
| 8 | TDA932x | HIP High-end input Processor | 7323 | Chroma IF IO | B2 |
| 13 | UV1318/... | Tuner protection | 1T01 | Tuner | B13a |
| 14 | MSPxxx | ITT sound processor | 7A02 | Audio module | B6a |
| 18 | Fast I ² C bus blocked | Spontaneous blinking error 18 | - | Fast I ² C Blocked | - |
| 21 | M62320 | I/O Expander | 7P56 | Video Dual Screen | B15b |
| 26 | SAA4998 | FEM (Falconic with Embedded Memory) | 7760 | +3V (FBX) Supply | B3b |
| 27 | T6TX5 | Eagle 1C | 7720 | +3V (FBX) Supply | B3c |
| 32 | M29W400xx | Flash Ram (EPG) | 7012 | EPG Memory | B5a |
| 35 | T6TU5 | Columbus | 7752 | Video Control | B3d |
| 55 | DC/DC converter | One of the voltages is not ok + protection error | - | Supply | - |
| 65 | IBO Module | Tuner error on "Digital Module" | - | TV module (IBO) | K6 |
| 66 | IBO Module | Demodulation OFDM error on "Digital Module" | - | TV module (IBO) | - |
| 67 | IBO Module | DENC error on "Digital Module" | - | TV module (IBO) | - |
| 68 | IBO Module | EEPROM on "Digital Module" | - | TV module (IBO) | - |
| 69 | IBO Module | I ² C error on "Digital Module" | - | TV module (IBO) | K1 |
| 76 | Audio supply | Audio supply protection | - | Sound Output | - |
| 83 | TEA 6422 | Source select matrix audio | 7117 | Video source select | B14d |
| 99 | IBO Module | Digital Board IBEX terminal | - | TV module (IBO) | - |
| 118 | AD9883A | AD converter | 7L01 | HD | B19a |
| 121 | EPLD | EPLD error | 7V01 | Video control | B19d |

Note:

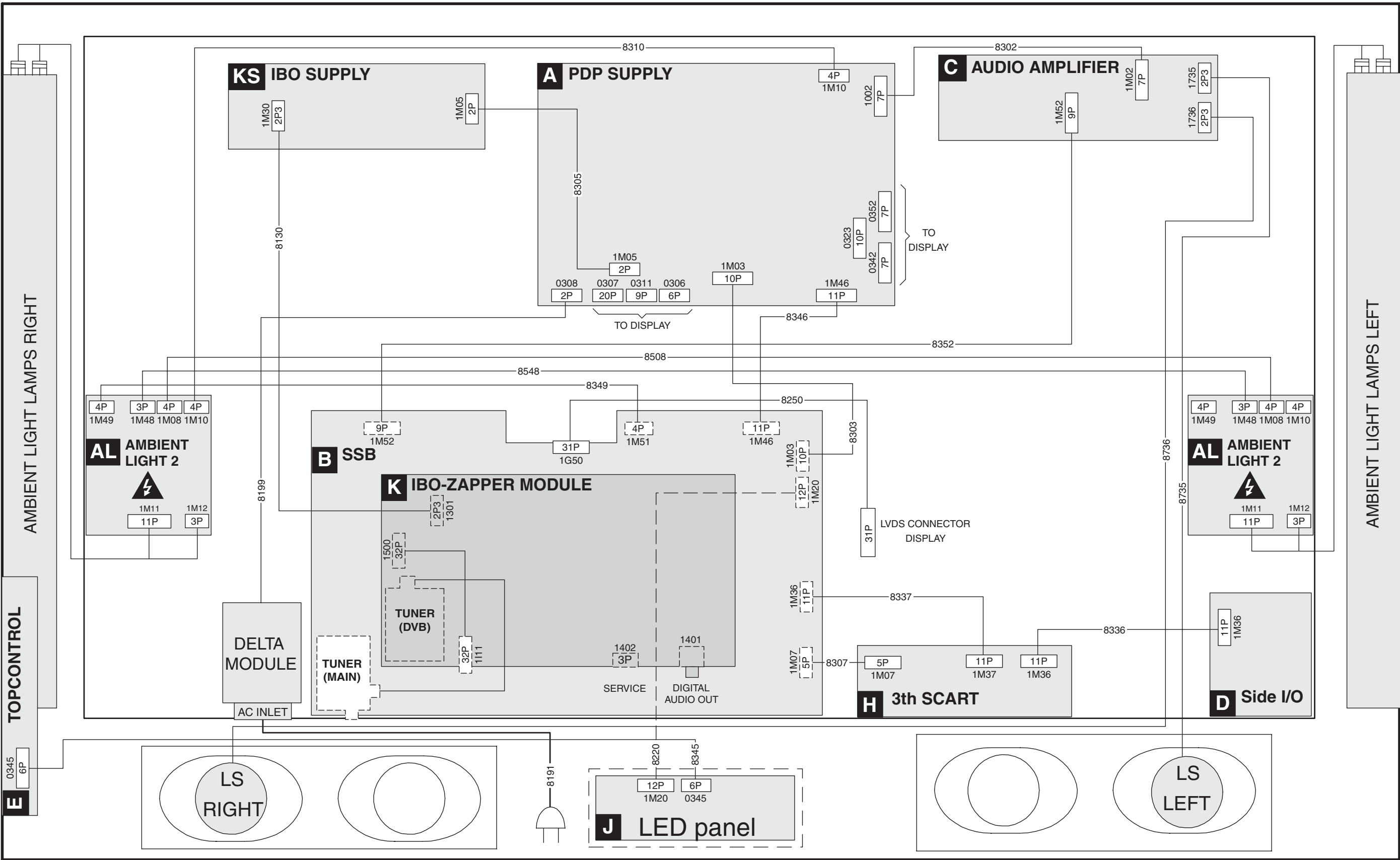
- Error codes 1, 6, or 18 are protection codes. If one of the errors appears, there are supplies of some circuits that will be switched "off". Also, in protection, the LED will blink the number of times equivalent to the most recent error code.
- If error 3 or error 55 appears, depending on the software version, error 16 is also logged. Error 16 is a non existing error.
- Depending on the SW version, it is possible that error 8 (HIP error) is logged when switching off the TV with the mains.
- Errors 65, 66, 67, 68, 69 and 99 are errors for the IBO module. Only errors 65 and 69 are possible errors. The other errors are for internal use.

Personal Notes:

6. Block Diagrams, Testpoint Overviews, and Waveforms

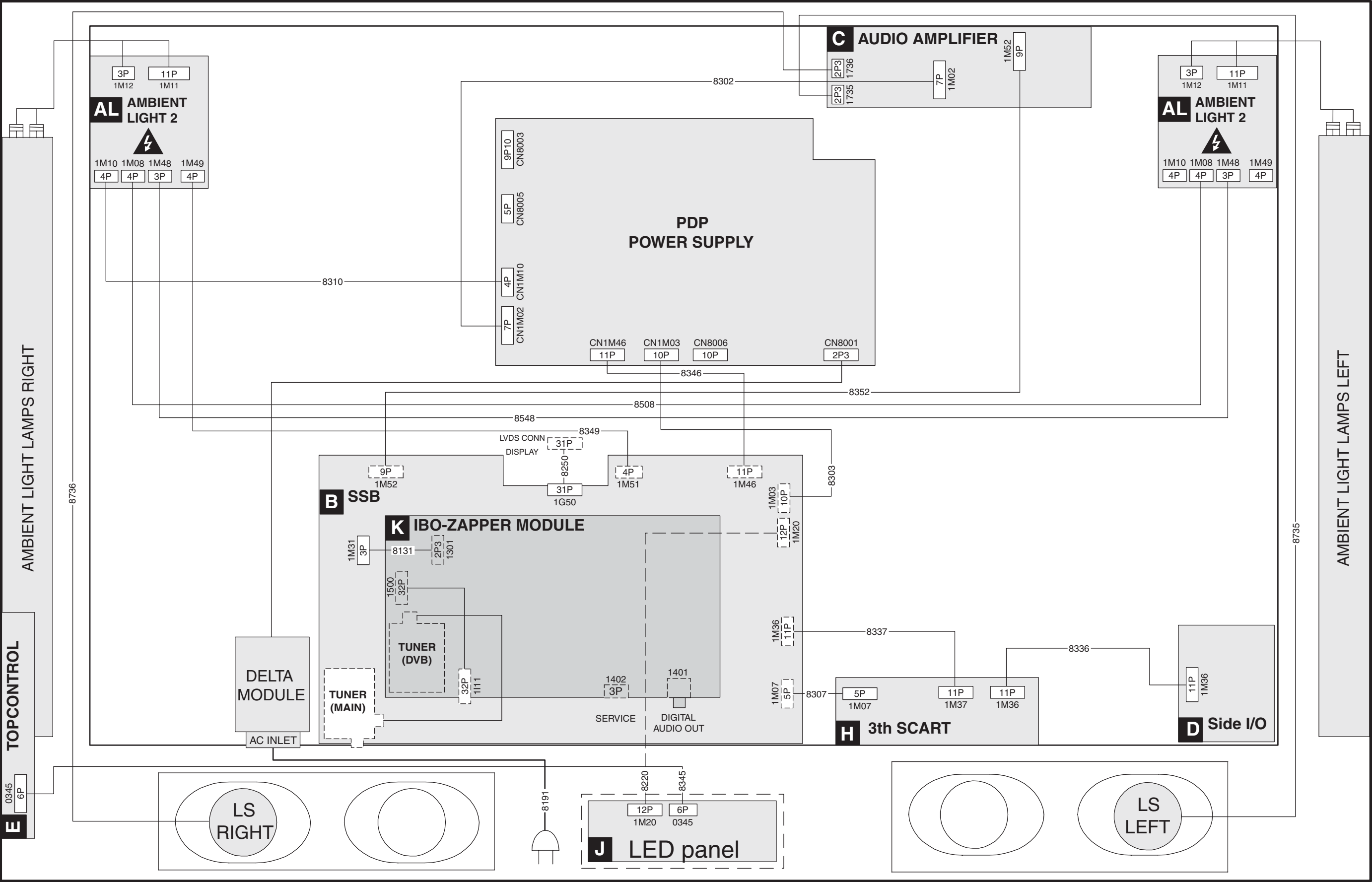
Wiring Diagram (42" FHP Step)

WIRING 42" FHP



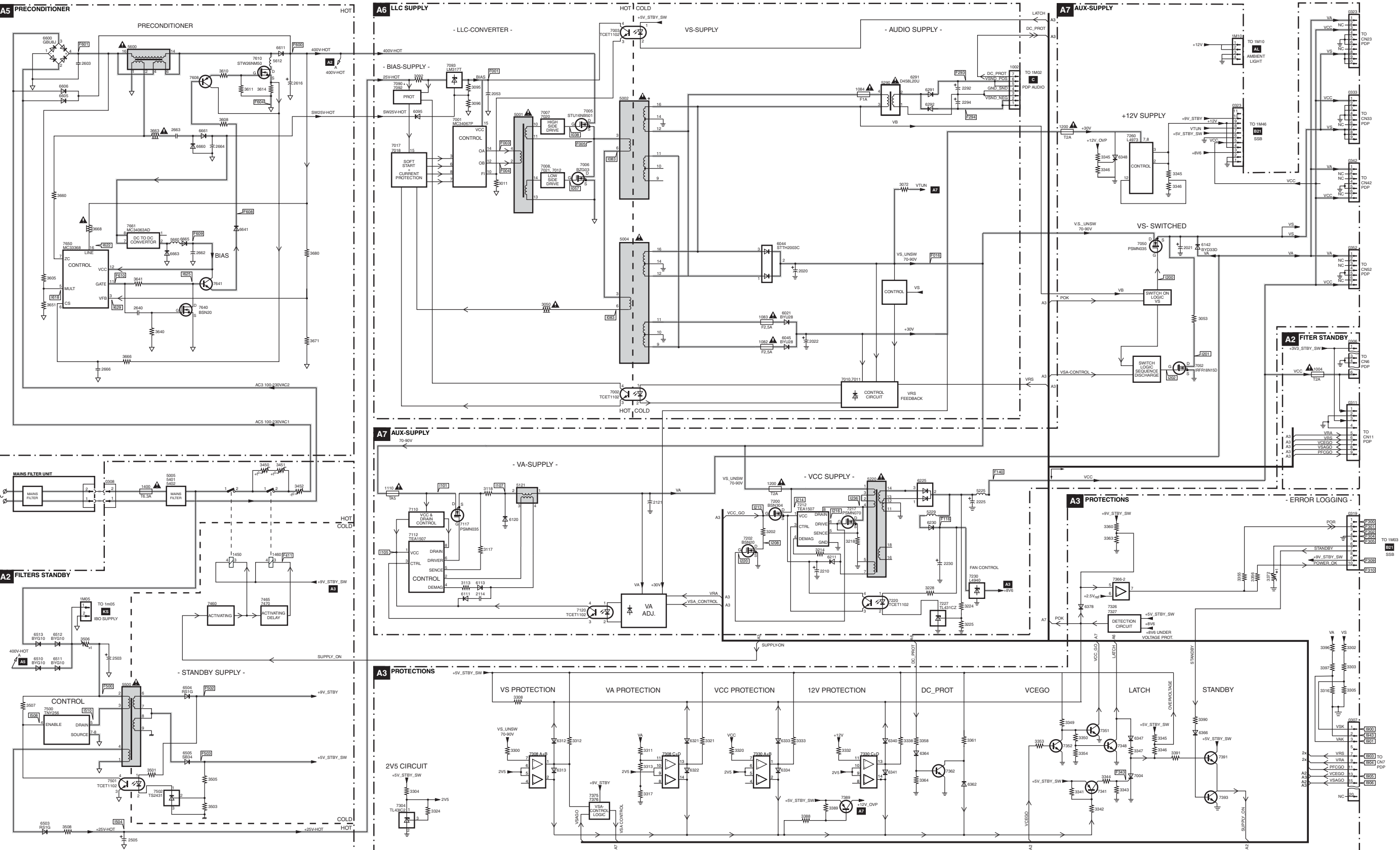
Wiring Diagram (50" SDI Step)

WIRING 50" SDI

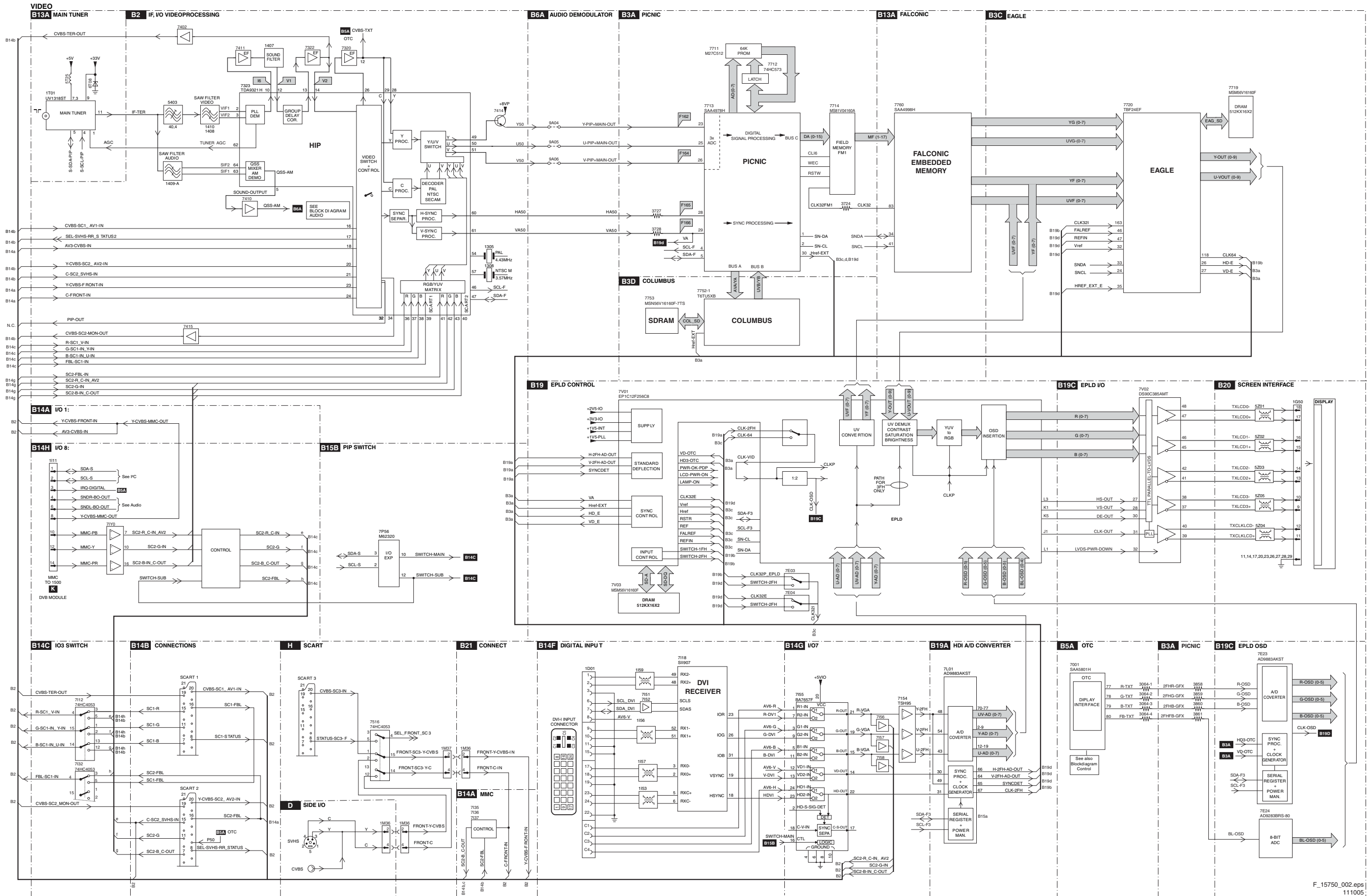


Block Diagram Supply

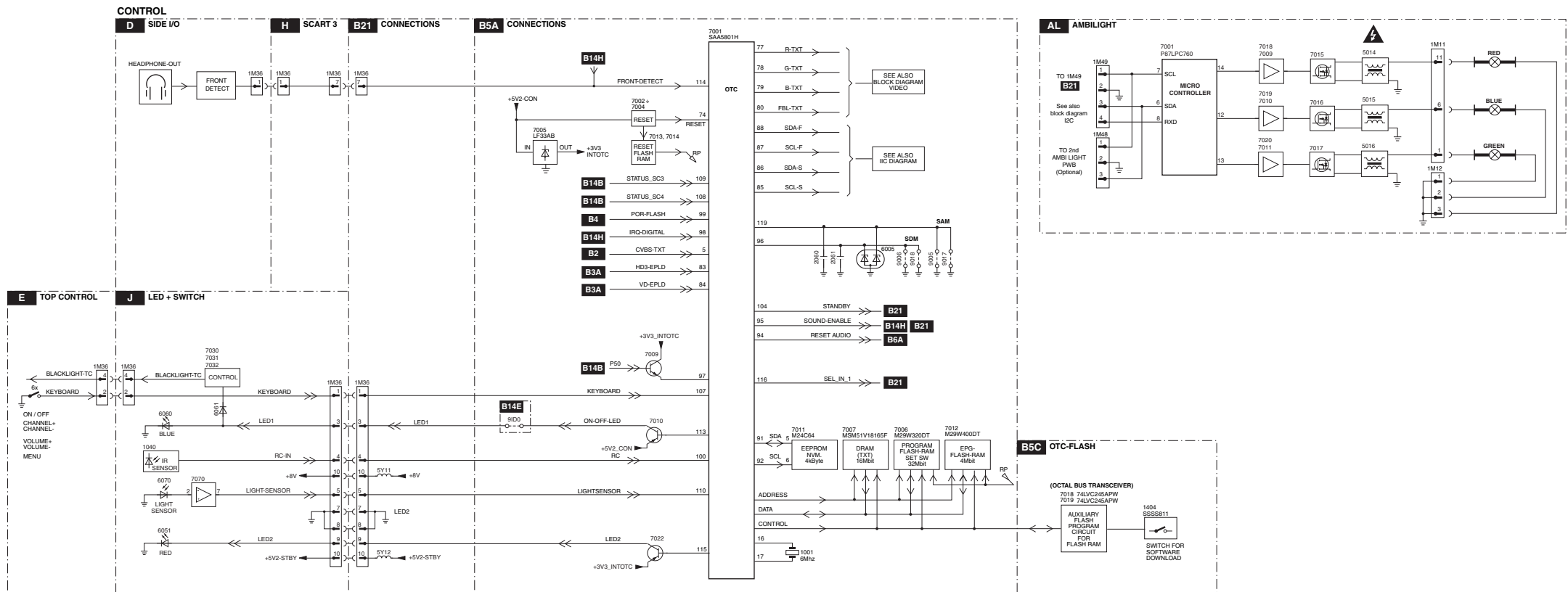
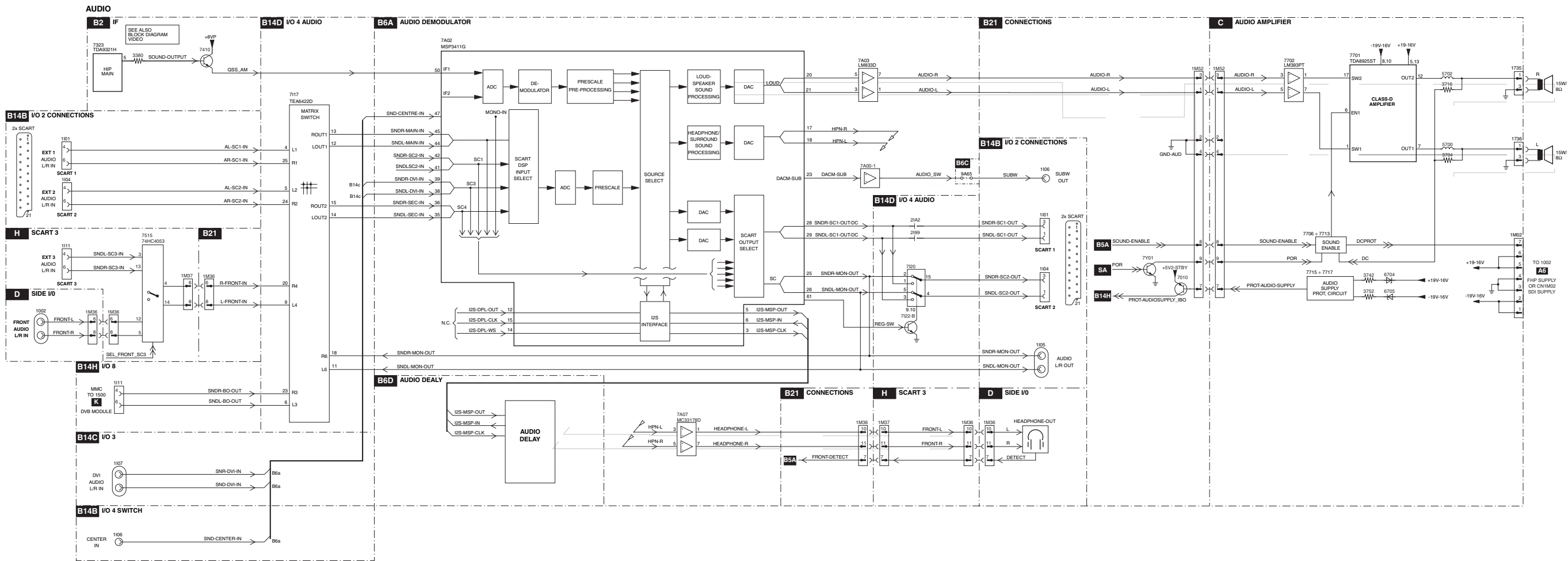
SUPPLY 42" FHP



Block Diagram Video

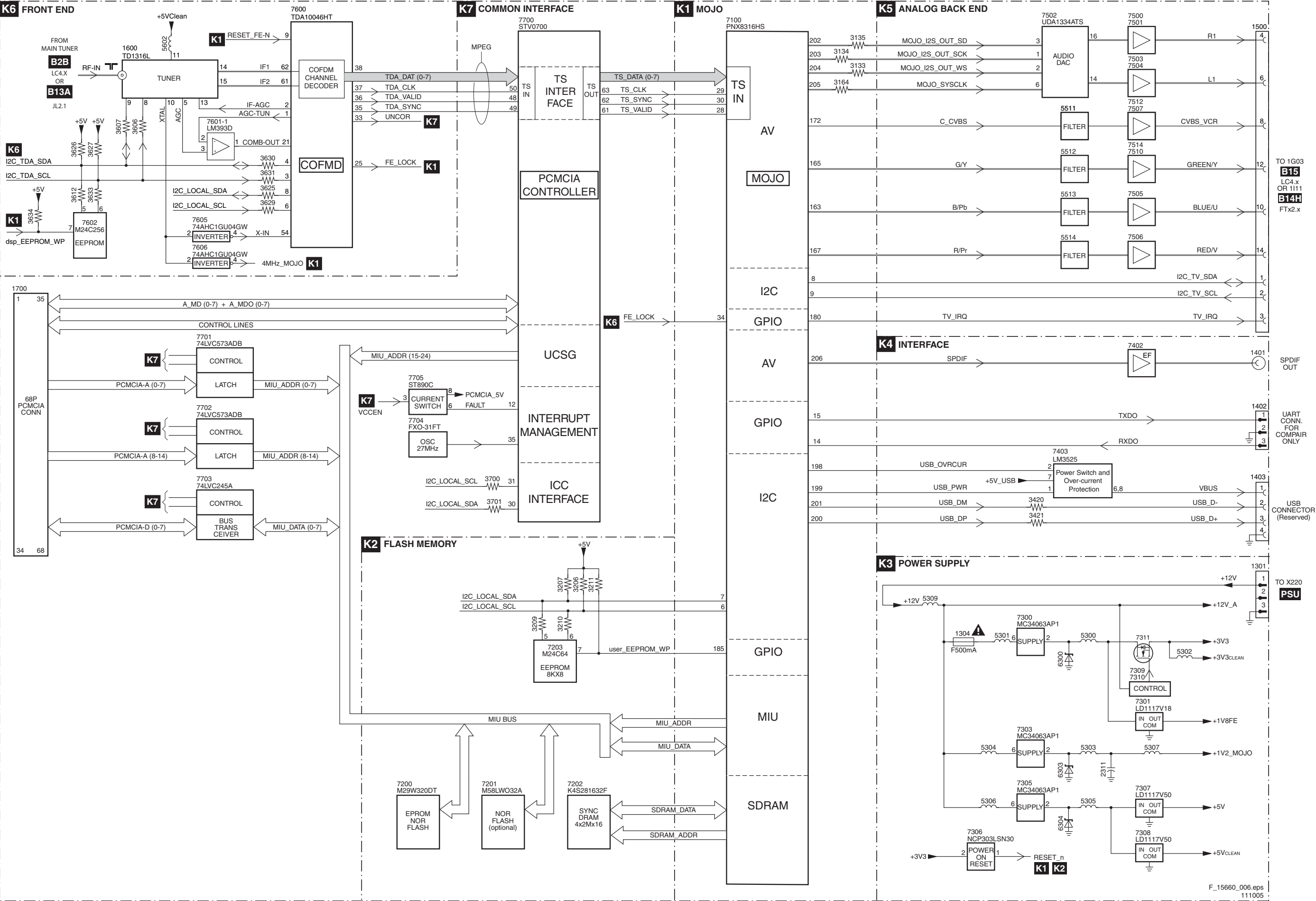


Block Diagram Audio

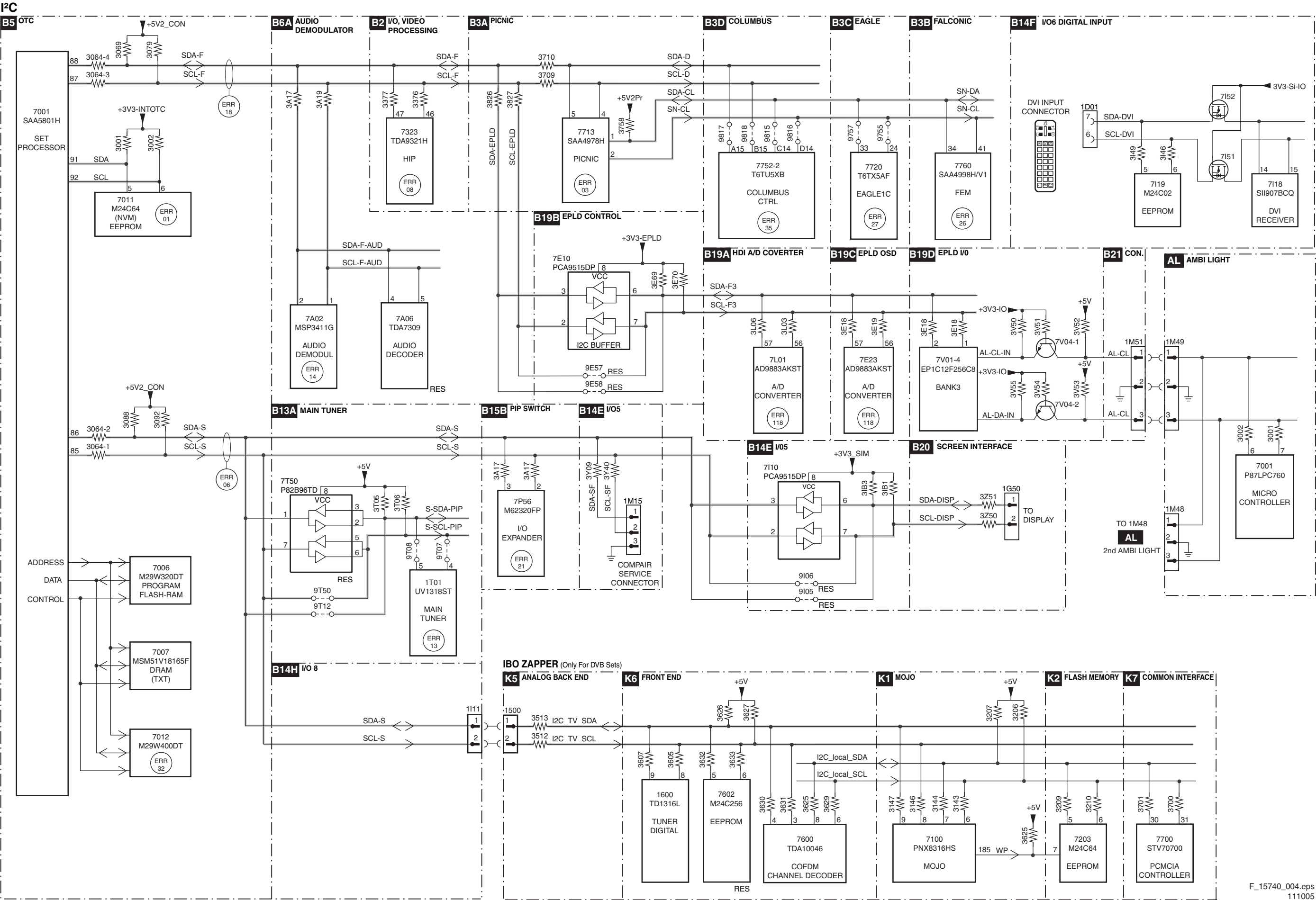


Block Diagram IBO Zapper

IBO - ZAPPER PANEL (DVB)

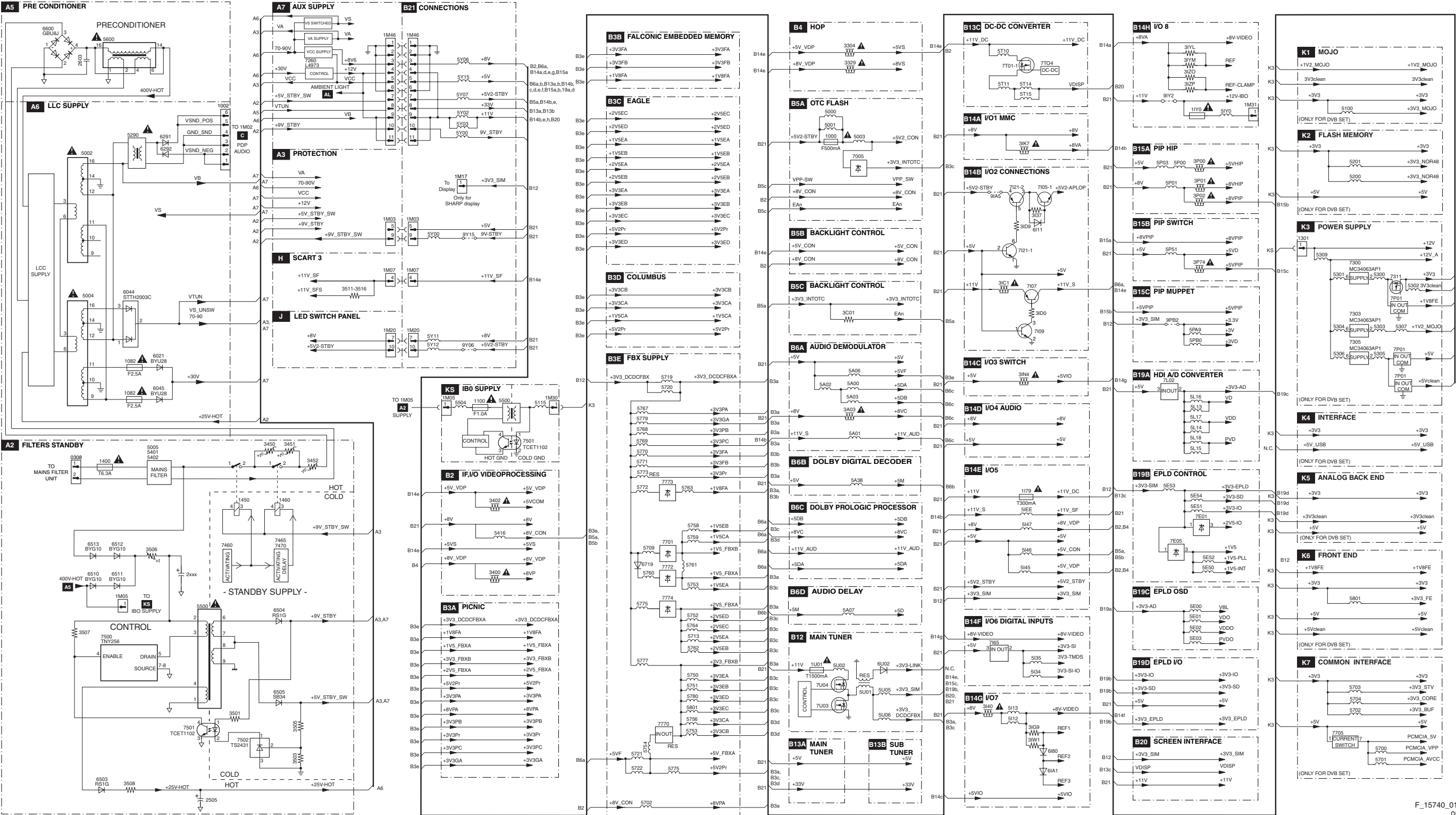


I2C IC's overview



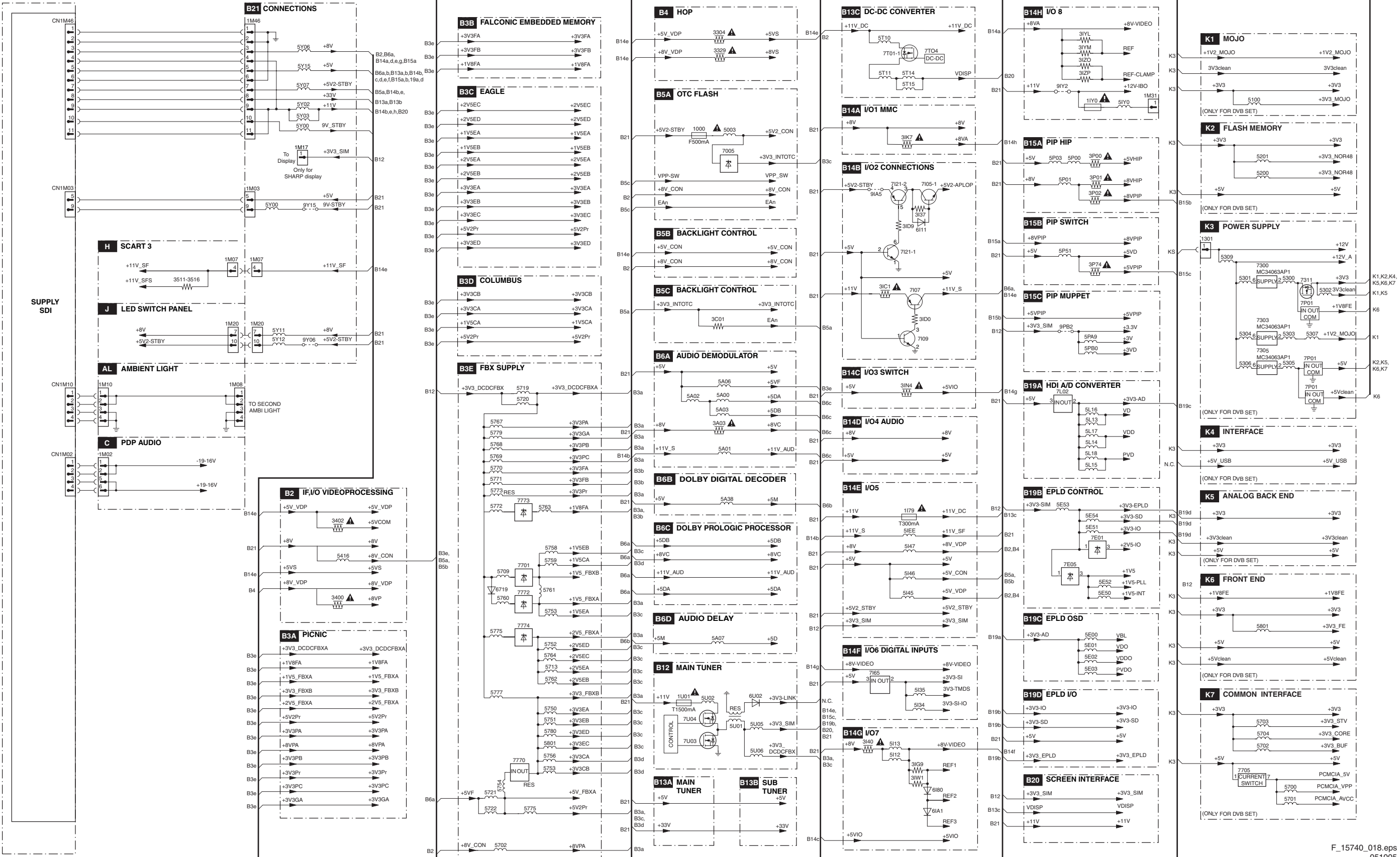
Supply Lines Overview 42" FHP Step

SUPPLY LINES OVERVIEW FHP 42"

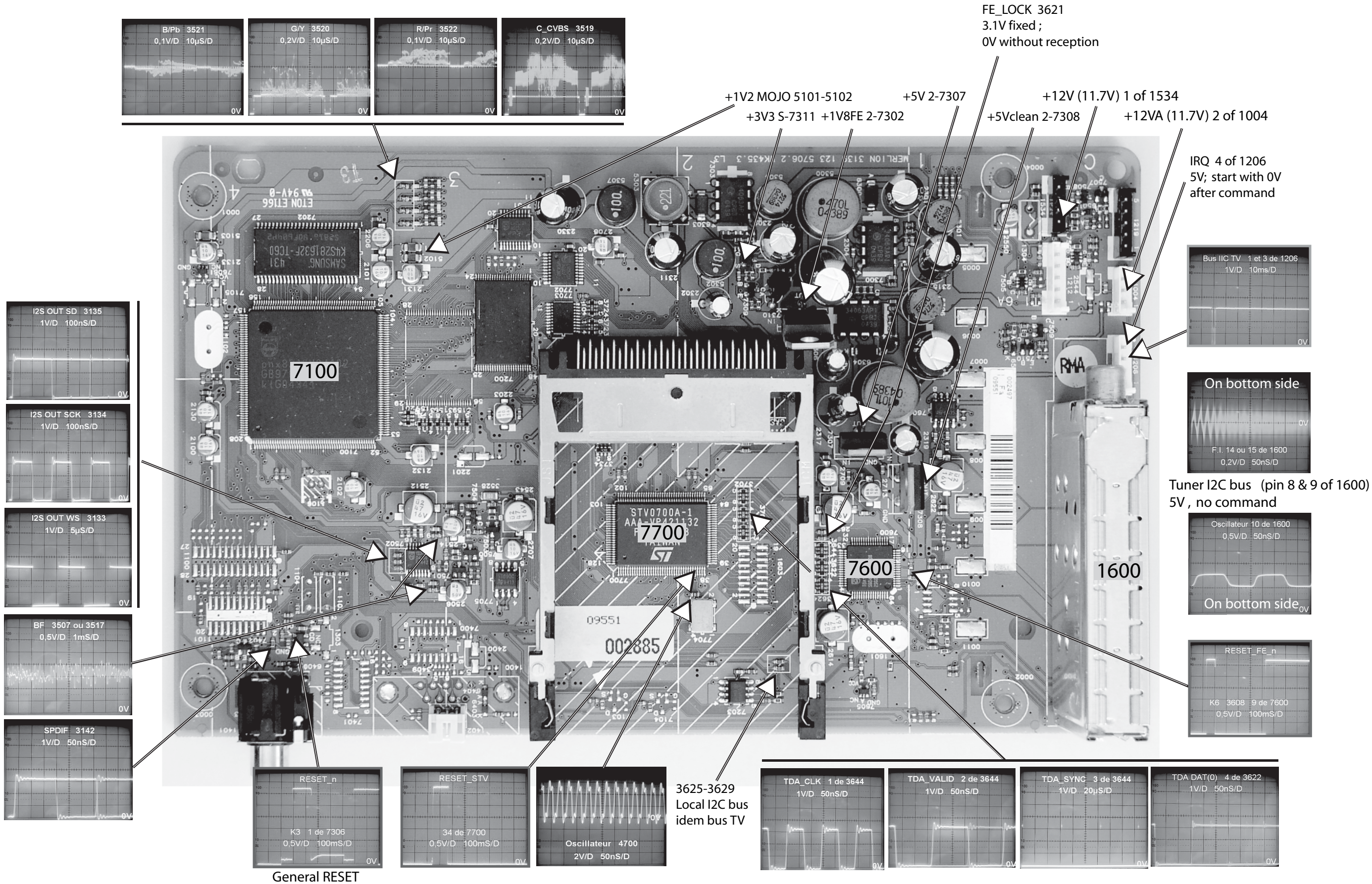


Supply Lines Overview 50" SDI Step

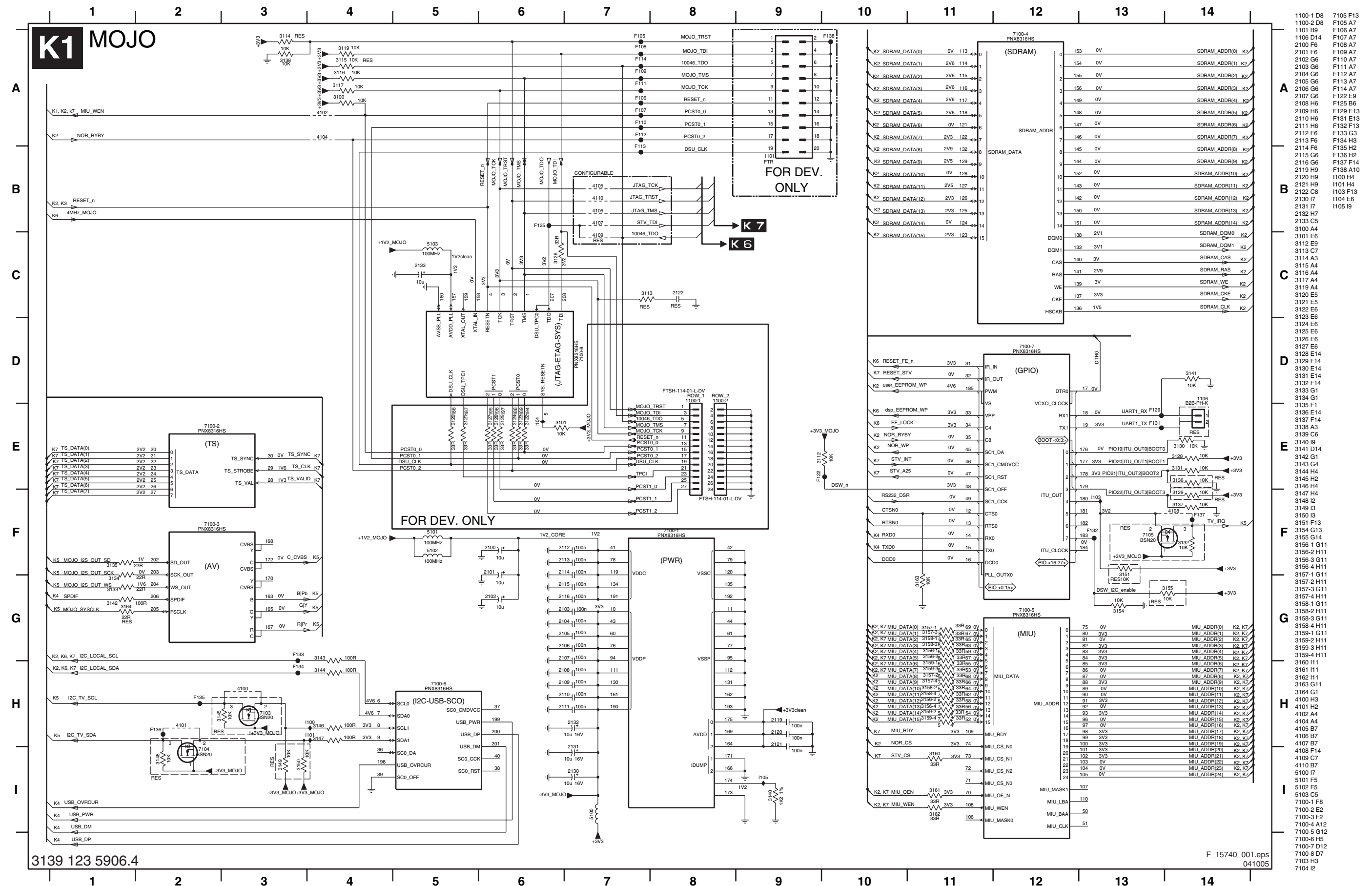
SUPPLY LINES OVERVIEW SDI 50"



Test Points and Waveforms IBO Zapper



IBO Zapper: Mojo



IBO Zapper: Flash Memory

K2 FLASH MEMORY

K2

A

B

C

D

E

F

G

H

0001 H1
0002 H1
0003 H2
0004 H2
0005 G3
0006 G4
0007 G4
0008 G5
0009 G5
0010 G6
0011 G6
0012 G7
0013 G8
0014 G9
0015 G9
0016 G10
0017 G10
0018 G11
2200 A13
2201 A12
2202 A13
2203 A8
2204 A9
2205 B13
2206 D5
2207 E4
2208 E4
2209 E4
2210 E4
2211 E4
2212 E4
2213 E4
2214 F11
3200 D6
3201 D14
3202 D13
3203 E11
3204 E12
3205 D9
3206 F12
3207 F13
3209 F13
3210 F13
3211 F12
3212 C10
4200 D7
4201 D7
4202 C7
4203 D7
4204 D7
4205 C9
4212 F13
4213 D13
4214 D11
4215 D9
5200 A12
5201 A8
5202 D3
5203 E11
7200 B8
7201 B12
7202 E3
7203 F11
F200 F12
F201 D6
I200 A12
I201 A8
I202 D4
I203 C12
I204 D7
I205 D6
I206 D9
I207 F12
I208 F13
I209 D12
I210 D12
I211 D13

A

B

C

D

E

F

G

H

3139 123 5906.4

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041005

IBO Zapper: Power Supply

K3

POWER SUPPLY

K3

FROM 1220 OF
POWER SUPPLY BOARD

POWER ON RESET

FOR DEV. ONLY

3139 123 5906.4

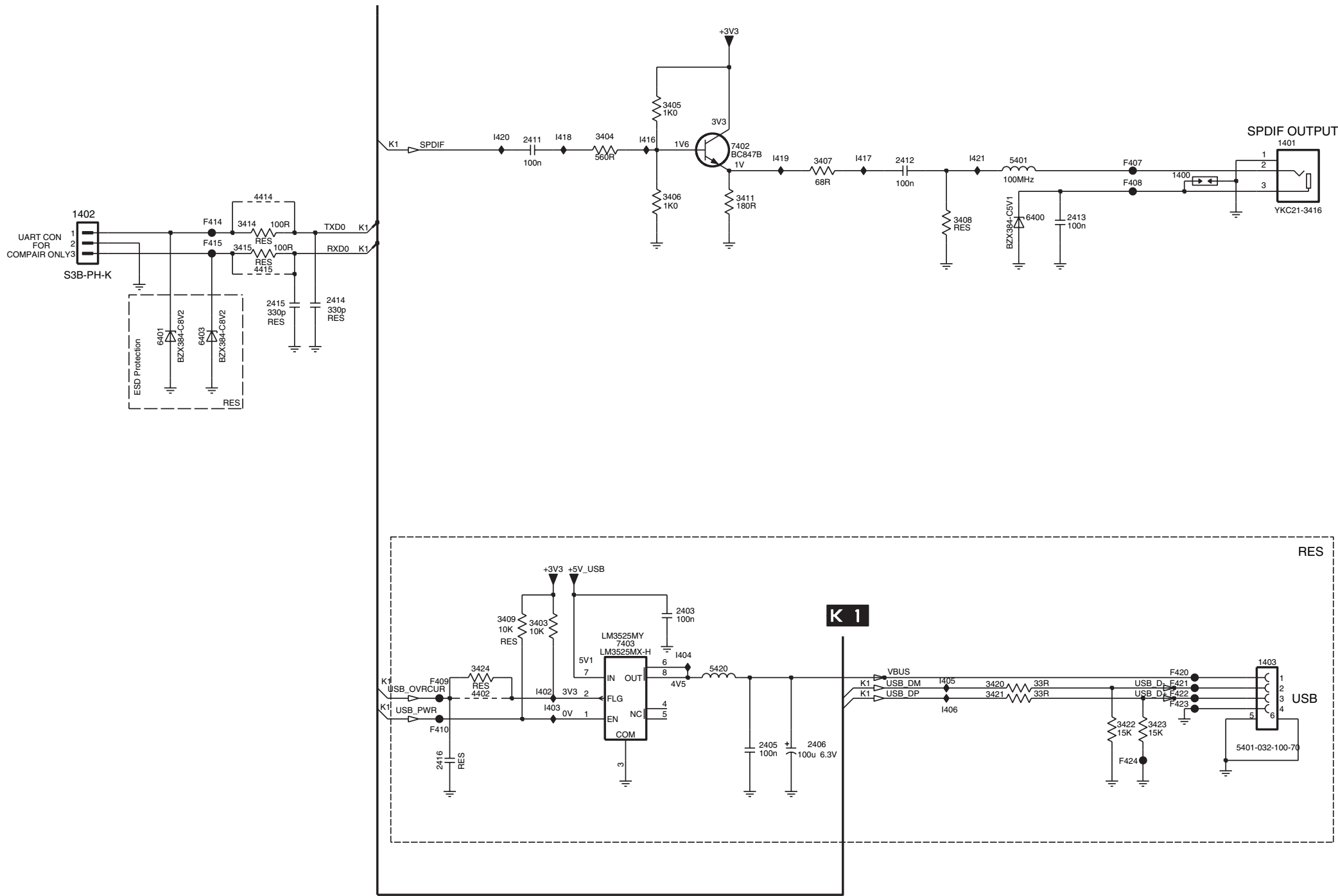
F_15740_003.eps
041005

- 1301 B1
1303 H3
1304 B6
2300 B10
2301 B7
2302 C13
2303 C8
2304 C11
2305 F11
2306 C12
2308 D10
2309 E7
2310 E8
2311 E11
2312 A11
2313 G10
2314 H2
2315 H7
2316 H8
2317 H12
2318 H11
2319 I13
2320 C12
2321 D11
2322 G11
2323 A11
2324 B10
2325 D10
2326 H11
2327 H11
2328 I11
2329 C9
2330 E12
2331 H9
2332 F13
2333 B2
2334 B3
2335 B3
2336 E9
2337 B11
3300 A7
3301 A7
3302 A8
3303 A7
3304 C9
3306 C8
3307 C9
3311 D8
3312 D7
3313 D7
3314 D7
3315 F9
3316 G3
3317 E9
3318 G7
3319 G7
3320 G7
3321 G8
3322 H9
3323 H8
3324 A12
3325 A13
3326 A11
3327 A13
3328 B13
3329 A12
3330 A11
3331 I8
3332 F9
3333 B11
3334 B12
3335 C12
4302 F11
4303 E12
5300 B11
5301 B7
5302 C12
5303 D11
5304 D6
5305 H11
5306 H6
5307 E12
5309 B3
6300 A10
6303 D11
6304 G11
6305 F11
6306 E11
6307 B12
7300 A9
7301 C12
7302 F12
7303 C9
7305 G9
7306 G2
7307 H12
7308 I12
7309 A13
7310 A12
7311 B11
7312 B12
F300 A7
F301 B5
F302 B5
F303 B13
F304 C13
F305 C1
F306 C1
F307 C12
F308 D7
F309 B2
- F310 E12
F312 H2
F313 H13
F314 I13
F315 G7
F316 H11
F317 F13
I301 D2
I302 D1
I306 D1
I310 A11
I312 A13
I313 B13
I314 B10
I316 B7
I317 B11
I318 B8
I321 D11
I322 D7
I323 E8
I324 G11
I325 H7
I326 H8
I327 E11
I328 B2
I330 F11
I331 F11

IBO Zapper: Interface

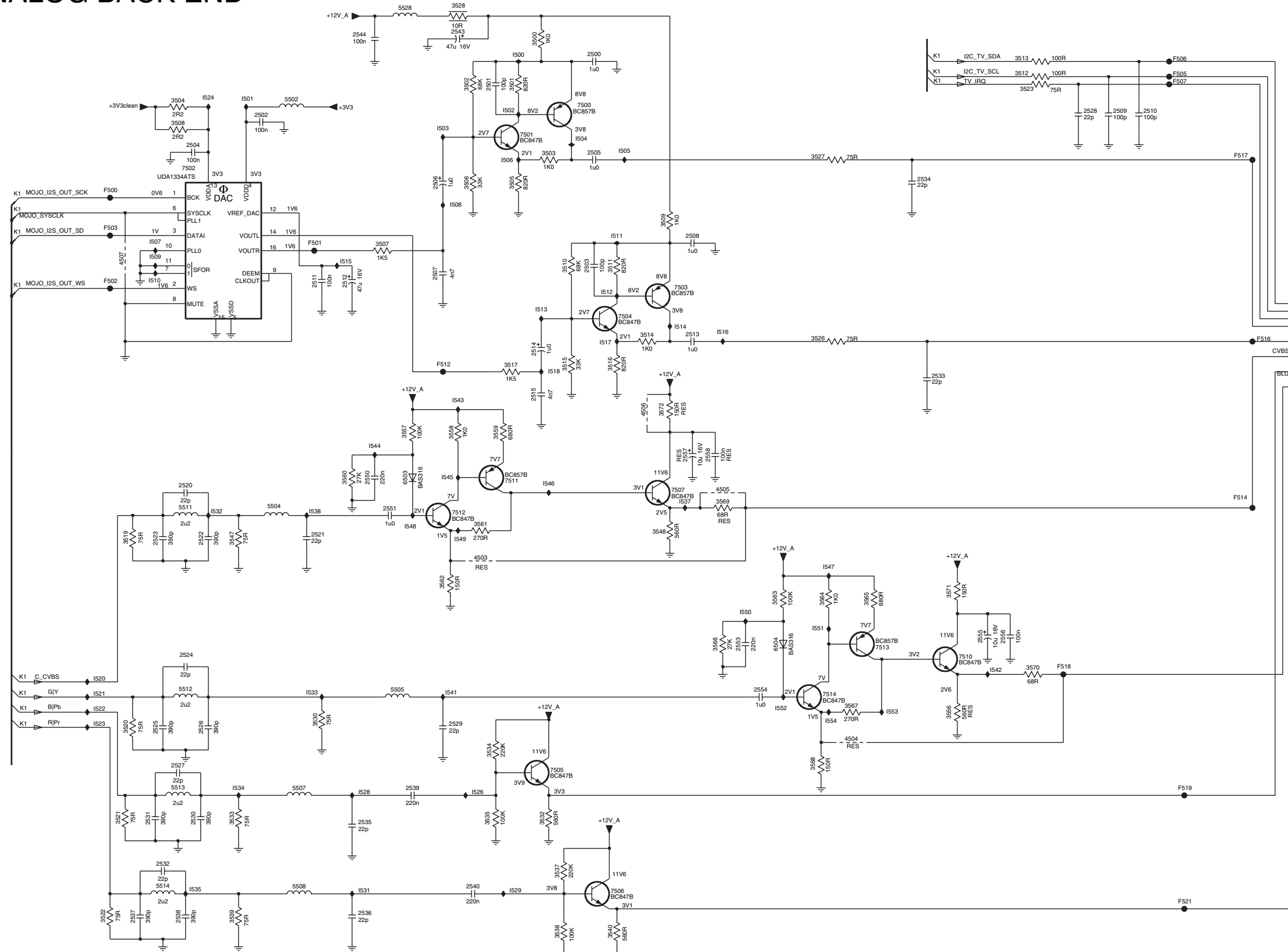
K4 INTERFACE

K4



- 1400 B10
- 1401 B11
- 1402 B3
- 1403 E11
- 2403 E7
- 2405 F7
- 2406 F8
- 2411 B6
- 2412 B8
- 2413 B10
- 2414 C4
- 2415 C4
- 2416 F5
- 3403 E6
- 3404 B6
- 3405 B7
- 3406 B7
- 3407 B8
- 3408 B9
- 3409 E6
- 3411 B7
- 3414 B4
- 3415 C4
- 3420 F9
- 3421 F9
- 3422 F10
- 3423 F10
- 3424 F5
- 4402 F5
- 4414 B4
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K5 ANALOG BACK END



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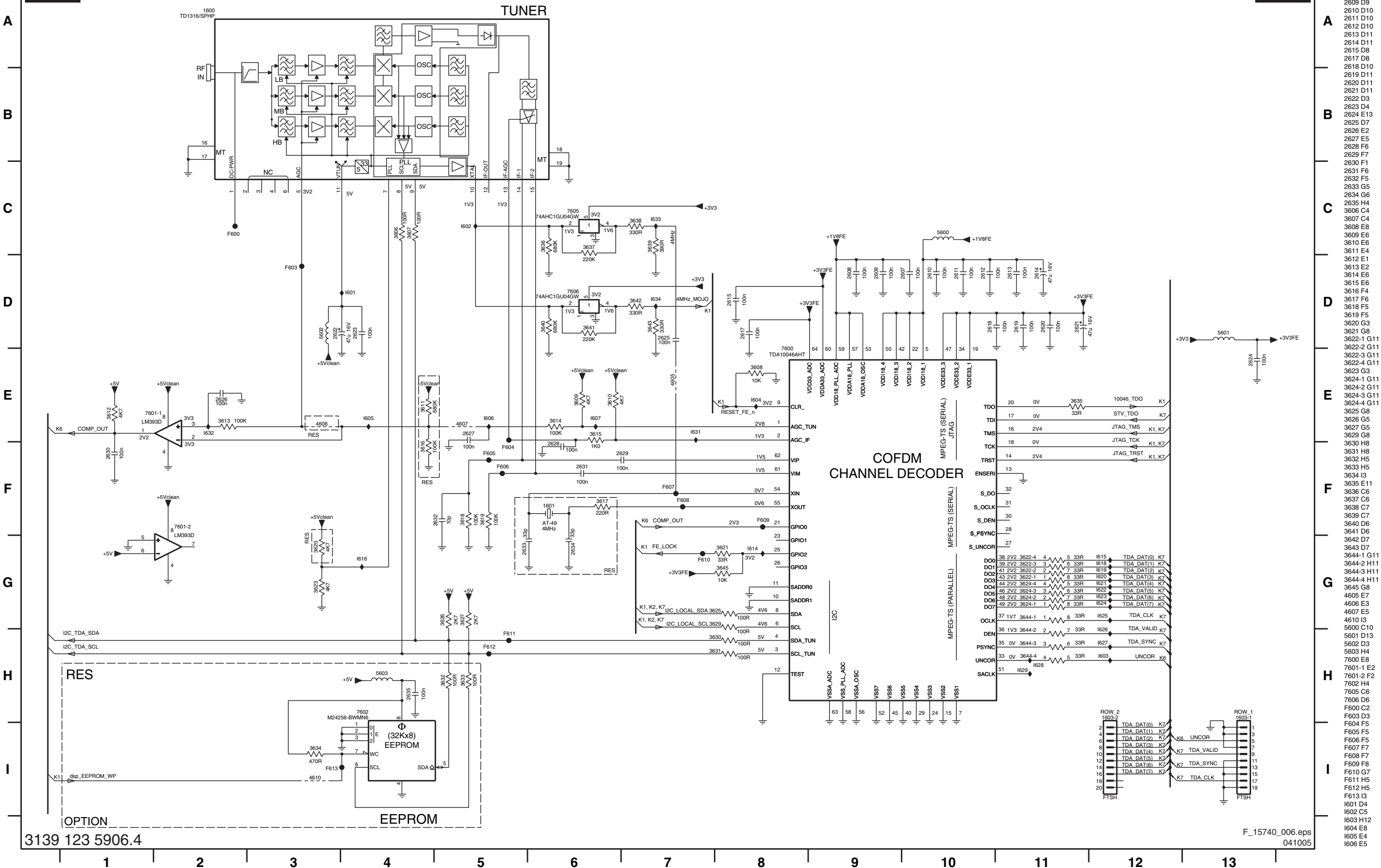
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2523 F3 F501 C4
2524 G3 F502 C2
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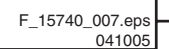
IBO Zapper: Front End

K6 FRONT END

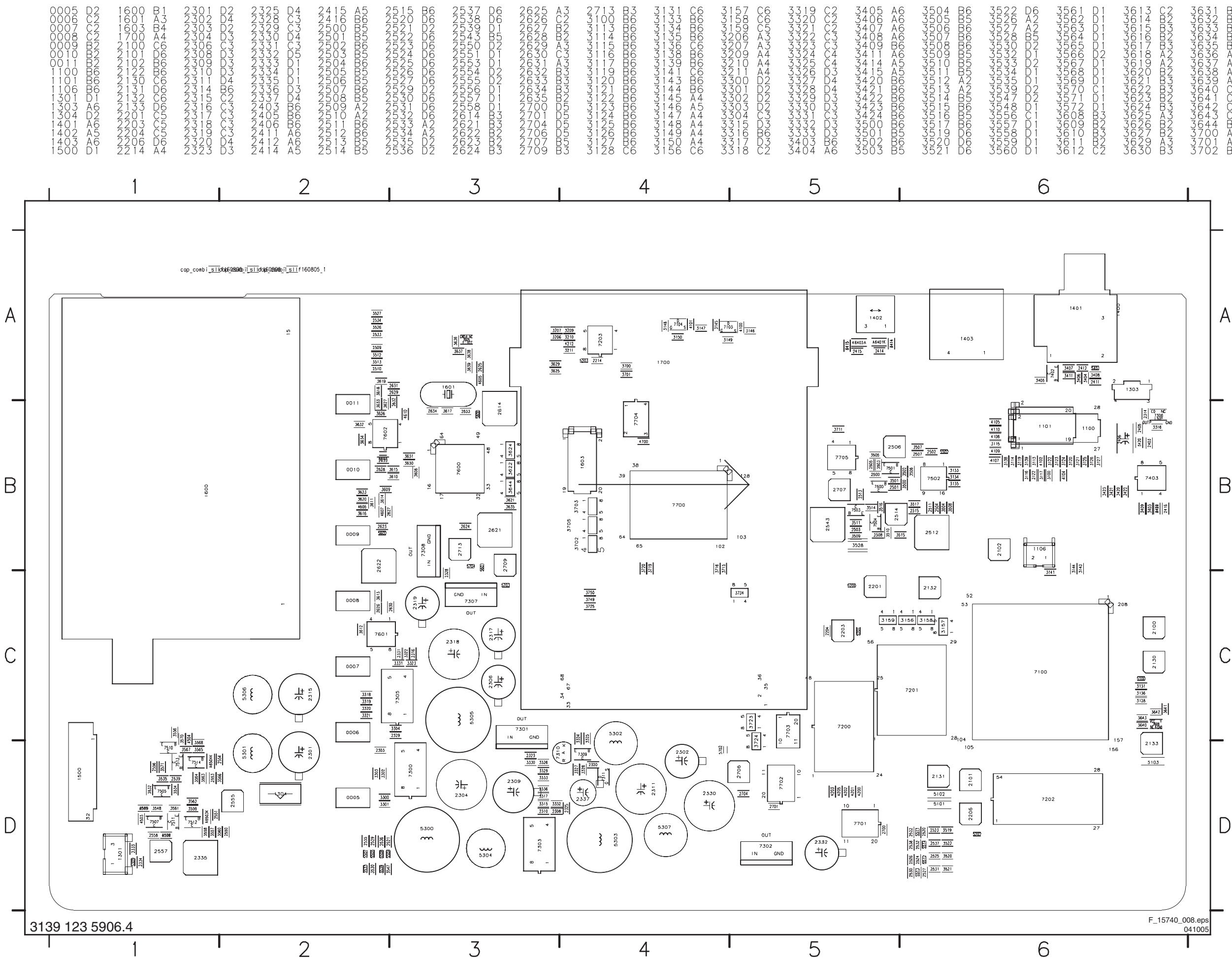
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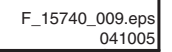
K7 COMMON INTERFACE



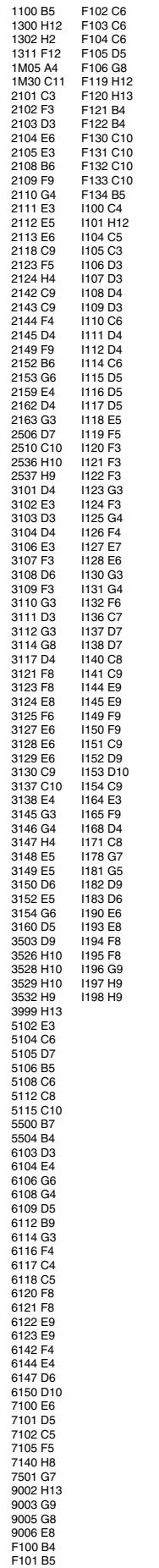
Layout IBO Zapper (Top Side)



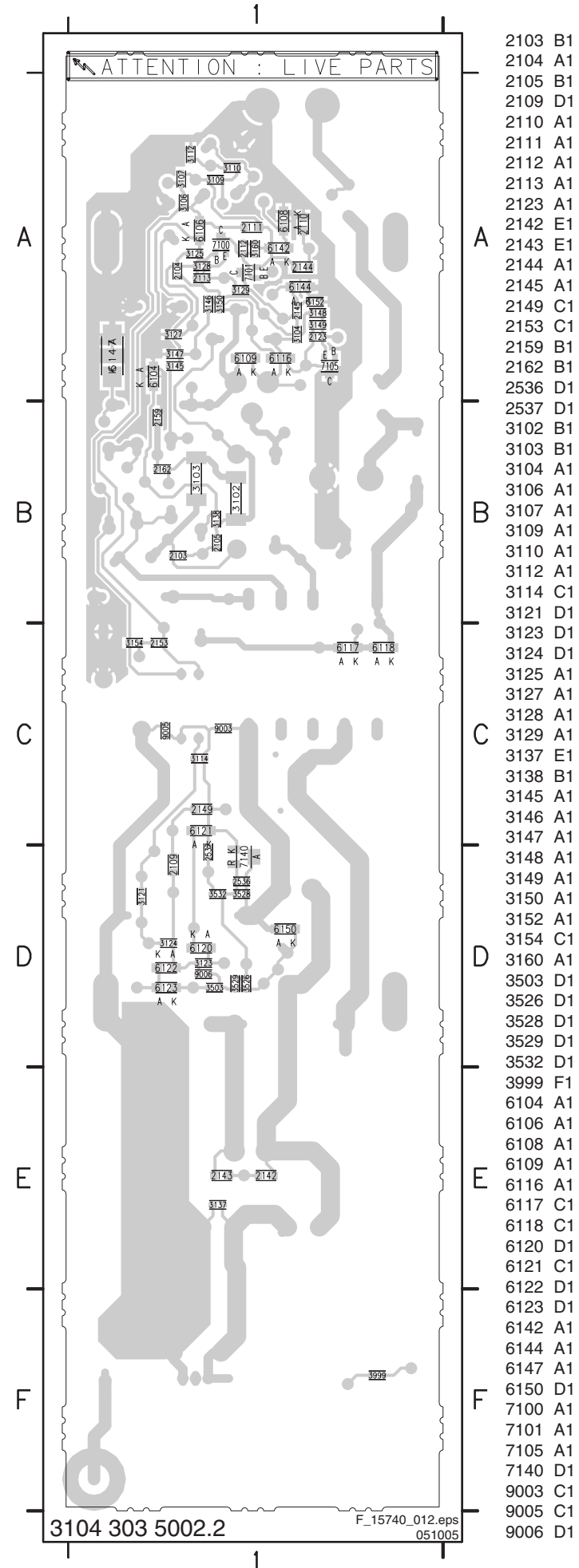
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KS IBO SUPPLY



Layout IBO Zapper Supply Panel (Bottom Side)



8. Alignments

See Service Manual FTP2.4E_AA (3122 785 15460).

9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

Index of this chapter:

- 9.1 Introduction
- 9.2 IBO Zapper Module
- 9.3 Block Diagram IBO Zapper Module
- 9.4 PNx83xx MOJO
- 9.5 Front End
- 9.6 Back End
- 9.7 IBOLink Interface
- 9.8 Control Interface
- 9.9 UART Interface
- 9.10 Power Supply IBO Zapper Module
- 9.11 Abbreviation List
- 9.12 IC Data Sheets

9.1 Introduction

The Digital Video Broadcasting (DVB) TV sets/models discussed in this manual are a combination of a standard TV set and an IBO zapper module. For a description of the original TV sets (without IBO zapper module), see the chassis related Service Manual.

9.2 IBO Zapper Module

The "IBO Zapper" module is meant to receive, process, and transfer Digital Video Broadcasting-Terrestrial (DVB-T) signals to the internal TV interface for audio, video, and control. The "IBO Zapper" is intended for use in combination with an analogue TV chassis.

9.3 Block Diagram IBO Zapper Module

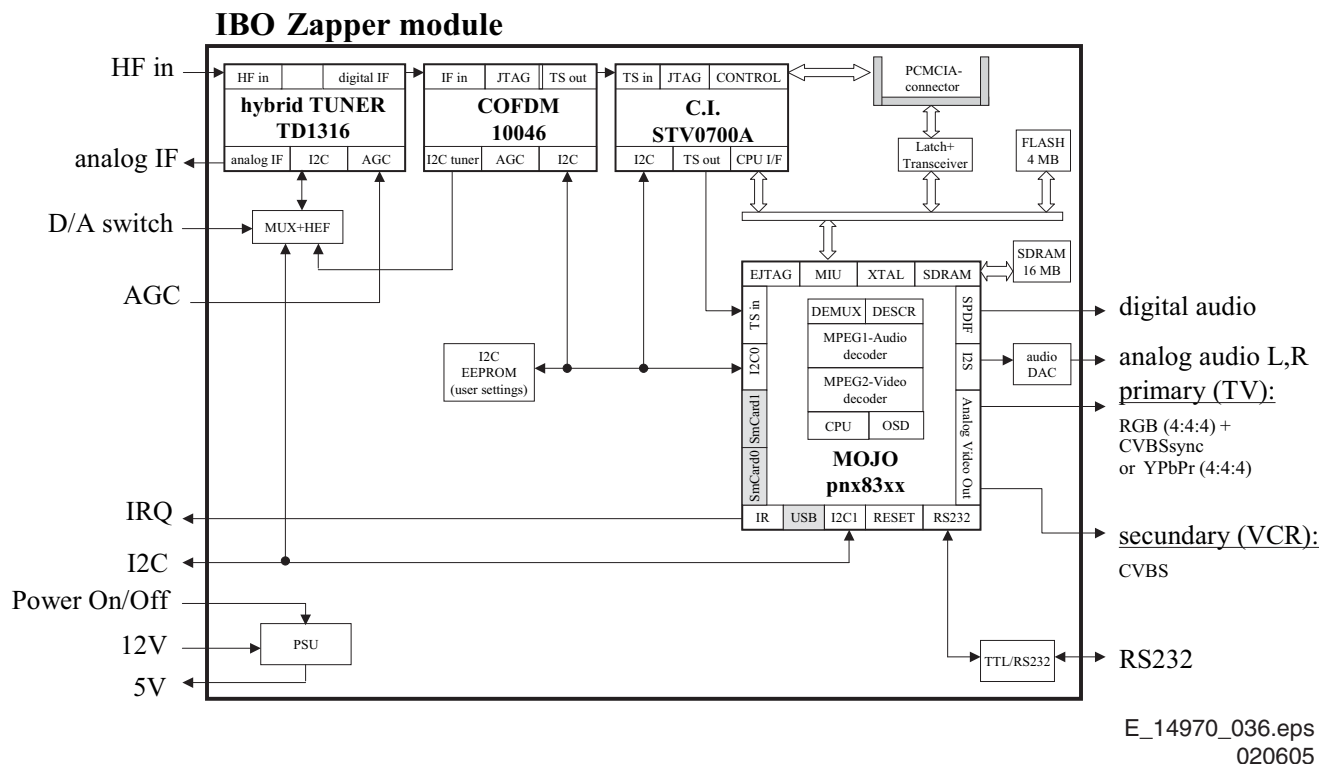


Figure 9-1 Block Diagram IBO zapper module

9.4 PNx83xx MOJO

The MOJO is a source decoder chip targeted for very low cost application in integrated digital televisions. The device contains all hardware and software to be able to decode and display MPEG2 transport streams, including:

- Descrambling.
- Demultiplexing.
- Audio / video decompression.
- Video encoding.
- Overlay graphics provisions.

Some features of the MOJO are:

- 32-bit PR1910 core operating at 120 MHz.
- 16-bit memory and peripheral interface to connect ROM, NOR Flash and various peripherals.
- Sixteen external interrupt inputs shared with PIO lines.
- Several embedded peripheral units with physical interfaces to:
 - Two UART (RS-232) data ports.
 - Two I²C master / slave transceivers.
 - Two smart-card reader interfaces.
 - One Integrated Conditional Access Module interface.
- Supports parallel and serial transport stream input interfaces.

9.5 Front End

The front end of the “IBO Zapper” module is almost identical to the “IBO+” module as used in the A10E with the exception that the Transport Streams that come from the COFDM demodulator are now fed through the PCMCIA controller first. The PCMCIA controller receives encrypted Transport Streams from the COFDM demodulator. Via the PCMCIA card, these encrypted Transport Streams are decrypted, and transported to the MOJO.

9.6 Back End

The MOJO is the main building block of the back-end of the “IBO Zapper” module. The IC decodes the MPEG-2 stream into analogue video and digital audio.

9.6.1 Transport Stream Input

The Transport Stream input is according to MPEG2 standard. In the “IBO Zapper”, only 8-bit parallel is supported. The used TS names are TDA_DATA.

9.6.2 Video Outputs

The MOJO has two analogue video outputs:

- Primary (TV): YUV + RGB.
- Secondary (VCR): CVBS.

The primary MOJO output is used as input for the TV display and is fed to the HIP RGB inputs. The signal path is as follows: switch 7112 chooses between the SCART1 input signal and the RGB output of the MOJO.

The secondary MOJO output, which delivers CVBS signals, is used for monitoring purposes or for recording via the SCART 2 output of the TV set. The signal path of the secondary MOJO output is as follows: the CVBS/VCR signal coming from the MOJO is sent to the HIP video switch input, pin 23. The signal then appears on one of the outputs of the HIP video switch, pin 34, and is passed on via buffer 7415 to pin 19 of SCART 2, which is the CVBS/monitor output.

For further details, see the manuals of the original TV sets on which the various models of IBO zappers are based.

9.6.3 Audio Outputs

The MOJO has two audio output interfaces:

- SPDIF Out: The SPDIF sound output goes directly to a connector on the back of the module.
- I²S Out: This digital sound output is fed through a DAC and the analogue L/R signals are directly fed via the source selector (item 7117) into the Audio Demodulator (item 7A02).

9.7 IBOLink Interface

The IBOLink™ approach is such that the conventional TV microcontroller is re-used when digital functionality is added. In principle, the TV can still operate without the bolt-on module. The IBOLink™ software is added to the TV-set software, and is operating as a software bridge.

9.8 Control Interface

The “IBO Zapper” is connected as a slave I²C device. The I²C bus should be +5V tolerable and operating at 100 kHz (max). The “IBO Zapper” module slave address is 0xE4 (similar to IBO+) but is configurable via IBOLink.

All communication from digital module to Television chassis has to be initiated via an active low hardware interrupt line from the digital module.

9.9 UART Interface

The UART interfaces (Universal Asynchronous Receiver And Transmitter) are serial interfaces, which are used to transfer data and commands between two devices.

The “IBO Zapper” system uses an UART interface for serial communication with a pc for:

- Diagnostic SW for Service or Production.
- SW uploading for Service or Development.

9.10 Power Supply IBO Zapper Module

The “IBO Zapper” module operates from a single 12 V supply provided by the TV chassis. All other voltages that the module needs are derived from the +12V. The module has four different physical power states:

- “Off” State.
- “Passive Stand-by”.
- “Active Stand-by”.
- “On” State.

9.10.1 Off State

The TV set is powered “off” via the main power switch. The module is not powered.

9.10.2 Passive Stand-by State

The TV set is in “Stand-by” mode. The module is in “off” state.

9.10.3 Active Stand-by State

The TV set is in “Semi-Stand-by” mode. All the circuits in the set, except the audio output and the display are powered up and fully active. The set appears to be in normal “Stand-by” mode for the customer.

The module is in “On” or “Logical Stand-by” state.

- “On” state. In this state the module can perform the following pre-programmed functions:
 - VCR (digital program) records.
 - EPG updates.
 - Over-the-air software download signalling detection and software downloads.
- “Logical Stand-by” state. In this state only over-the-air software download signalling detection and software downloads can be performed.

9.10.4 On State

The TV set is fully functional and the module is powered up. The module is in “On” or “Logical Stand-by” state.

- “On” state. In this state all system functionality is available or the module is in software downloading process.
- “Logical Stand-by” state. In this state only over-the-air software download signalling detection and software downloads can be performed.

9.11 Abbreviation List

| | |
|-----------|---|
| 1080i | 1080 visible lines, interlaced |
| 1080p | 1080 visible lines, progressive scan |
| ADC | Analogue to Digital Converter |
| AFC | Automatic Frequency Control; Control signal used to tune and lock to the correct frequency |
| AGC | Automatic gain control (feedback) signal to the tuner. This circuit ensures a constant output amplitude regardless of the input amplitude |
| AP or A/P | Asia Pacific |
| AV | External Audio Video |
| B-SC1-IN | Blue SCART1/EXT1 in |
| B-SC2-IN | Blue SCART2/EXT2 in |
| B-TXT | Blue Teletext |
| B/G | Monochrome TV system. Sound carrier distance is 5.5 MHz. B= VHF-band, G= UHF-band |
| C-FRONT | Chrominance front input |
| CAM | Conditional Access Module |
| CBA | Circuit Board Assembly (also called PCB or PWB) |
| CI(M) | Common Interface (Module); E.g PCMCIA slot for a CAM in a set top box |
| ComPair | Computer aided rePair. A tool for diagnosing a TV through a PC controlled interface |
| COFDM | Coded Orthogonal Frequency Division Multiplexing; A multiplexing technique that distributes the data to be transmitted over many carriers |
| CSM | Customer Service Mode |
| CVBS | Composite Video and Blanking Signal; A single video signal that contains luminance, colour, and timing information |
| DAC | Digital to Analogue Converter |
| DFU | Directions For Use: Owner's manual |
| DCSM | Digital Customer Service Mode |
| DRAM | Dynamic RAM; dynamically refreshed RAM |
| DSP | Digital Signal Processing |
| DST | Dealer Service Tool; Special remote control designed for dealers to enter e.g. service mode (a DST-emulator is available in ComPair) |
| DVB | Digital Video Broadcast; A method of transmitting digital audio and video, based on MPEG2 |
| DVB-T | DVB-Terrestrial; HDTV standard for the EU |
| EEPROM | Electrically Erasable and Programmable Read Only Memory |
| EJTAG | Enhanced Joint Test Action Group; Definition for a standardised serial test interface |
| EPG | Electronic Program Guide: system used by broadcasters to transmit TV guide information (= NexTVView) |
| EXT | EXTernal (source), entering the set by SCART or by cinches (jacks) |
| FBL | Fast BLanking; DC signal accompanying RGB signals. To blank the video signal when it is returning from the right side of the screen to the left side. The video level is brought down below the black video level |
| FBX | Feature BoX; Part of the small signal board /separate module which contains 100 Hz processing, extra features and AutoTV algorithms |

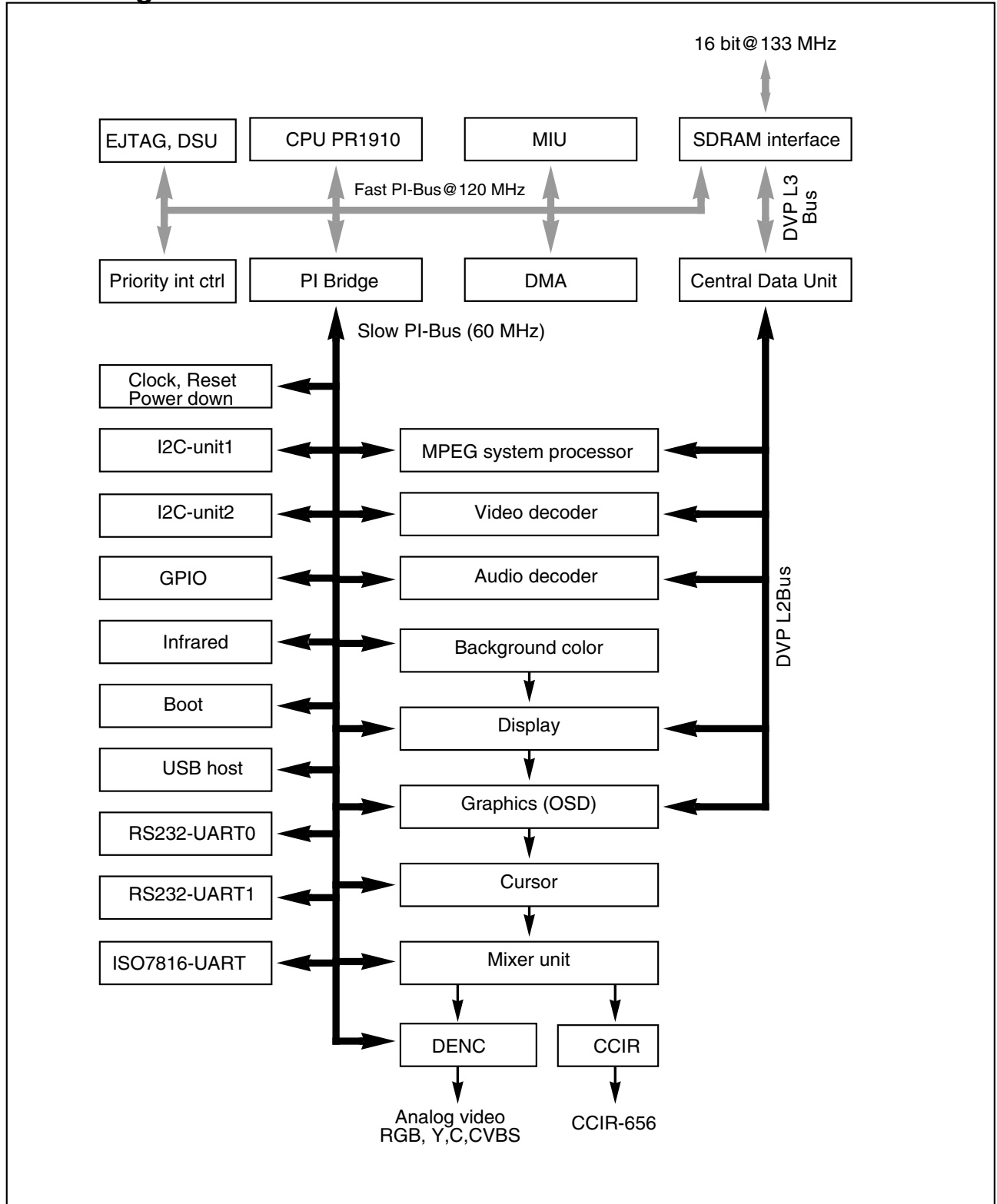
| | | | |
|------------------|--|--------|---|
| | (FBX6= based on PICNIC, FBX7= based on PICNIC and Eagle, FBX8= based on PICNIC, Eagle, and Columbus) | PWB | Printed Wiring Board (also called PCB or CBA) |
| H | H_sync to the module | QAM | Quadrature Amplitude Modulation; modulation method |
| HD | High Definition | QPSK | Quadrature Phase Shift Keying (or 4-QAM) |
| I | Monochrome TV system. Sound carrier distance is 6.0 MHz. VHF- and UHF-band | RAM | Random Access Memory |
| I ² C | Integrated IC bus | RC | Remote Control transmitter |
| I ² S | Integrated IC Sound bus | RGB | Red, Green, and Blue colour space; The primary colour signals for TV. By mixing levels of R, G, and B, all colours (Y/C) are reproduced |
| IC | Integrated Circuit | | |
| IF | Intermediate Frequency | RGBHV | Red, Green, Blue, Horizontal sync, and Vertical sync |
| Interlaced | Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in "pairs", causing line flicker. | ROM | Read Only Memory |
| IR | Infra Red | SAM | Service Alignment Mode |
| IRQ | Interrupt ReQuest | SC-IN | SCART in |
| LATAM | LATin AMERICA | SC-OUT | SCART out |
| LCD | Liquid Crystal Display | S/C | Short Circuit |
| LED | Light Emitting Diode; A semiconductor diode that emits light when a current is passed through it | SCART | Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs; This is a 21-pin connector used in EU, that carries various audio, video, and control signals (it is also called Péritel connector) |
| L/L' | Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I | SCL | Serial CLock Signal on I ² C bus |
| LVDS | Low Voltage Differential Signalling, data transmission system for high speed and low EMI communication. | SD | Standard Definition |
| MHEG | Multimedia and Hypermedia information coding Expert Group | SDRAM | Synchronous DRAM |
| M/N | Monochrome TV system. Sound carrier distance is 4.5 MHz. M= 525 lines @ 60 Hz, N= 625 lines @ 50 Hz | SECAM | SÉquence Couleur Avec Mémoire; Colour system mainly used in France and East Europe. The chroma is FM modulated and the R-Y and B-Y signals are transmitted line sequentially. Colour carriers= 4.406250 MHz and 4.250000 MHz |
| MOSFET | Metal Oxide Semiconductor Field Effect Transistor | SIF | Sound Intermediate Frequency |
| MPEG | Motion Pictures Experts Group. An ISO/IEC body that has given its name to an image compressing scheme for moving video | S/PDIF | Sony Philips Digital InterFace; This is a consumer interface used to transfer digital audio |
| MSP | Multi-standard Sound Processor: ITT sound decoder | SRAM | Static RAM |
| NC | Not Connected | STBY | STandBY |
| NICAM | Near Instantaneously Companded Audio Multiplexing; This is a digital sound system, mainly used in Europe | SVHS | Super Video Home System |
| NTSC | National Television Standard Committee. Colour system used mainly in North America and Japan. Colour carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air) | SW | Software or Subwoofer or Switch |
| NVM | Non Volatile Memory; IC containing data such as alignment values, preset stations | TXT | Teletext; TXT is a digital addition to analogue TV signals that contain textual and graphical information (25 rows x 40 columns). The information is transmitted within the first 25 lines during the Vertical Blank Interval (VBI) |
| O/C | Open Circuit | uP | Microprocessor |
| PAL | Phase Alternating Line. Colour system used mainly in Western Europe (colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz) | VCR | Video Cassette Recorder |
| PCB | Printed Circuit Board (or PWB) | XTAL | Quartz crystal |
| PCMCIA | Personal Computer Memory Card International Association | Y | Luminance signal |
| PLL | Phase Locked Loop. Used, for example, in FST tuning systems. The customer can directly provide the desired frequency | Y/C | Y consists of luminance signal, blanking level and sync; C consists of chroma (colour) signal |
| Progressive Scan | Scan mode where all scan lines are displayed in one frame at the same | YPbPr | This is a scaled version of the YUV colour space. Y= Luminance, Pb/Pr= Colour difference signals B-Y and R-Y, other amplitudes w.r.t. to YUV |
| | | YUV | Colour space used by the NTSC and PAL video systems. Y is the luminance and U/V are the colour difference signals |

9.12 IC Data Sheets

This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

9.12.1 Diagram K1, PNx83xx (IC7100)

Block Diagram



E_14970_043.eps
020605

Figure 9-2 PNx831x architecture and data paths

9.12.2 Diagram K6, TDA10046 (IC7600)

Block Diagram

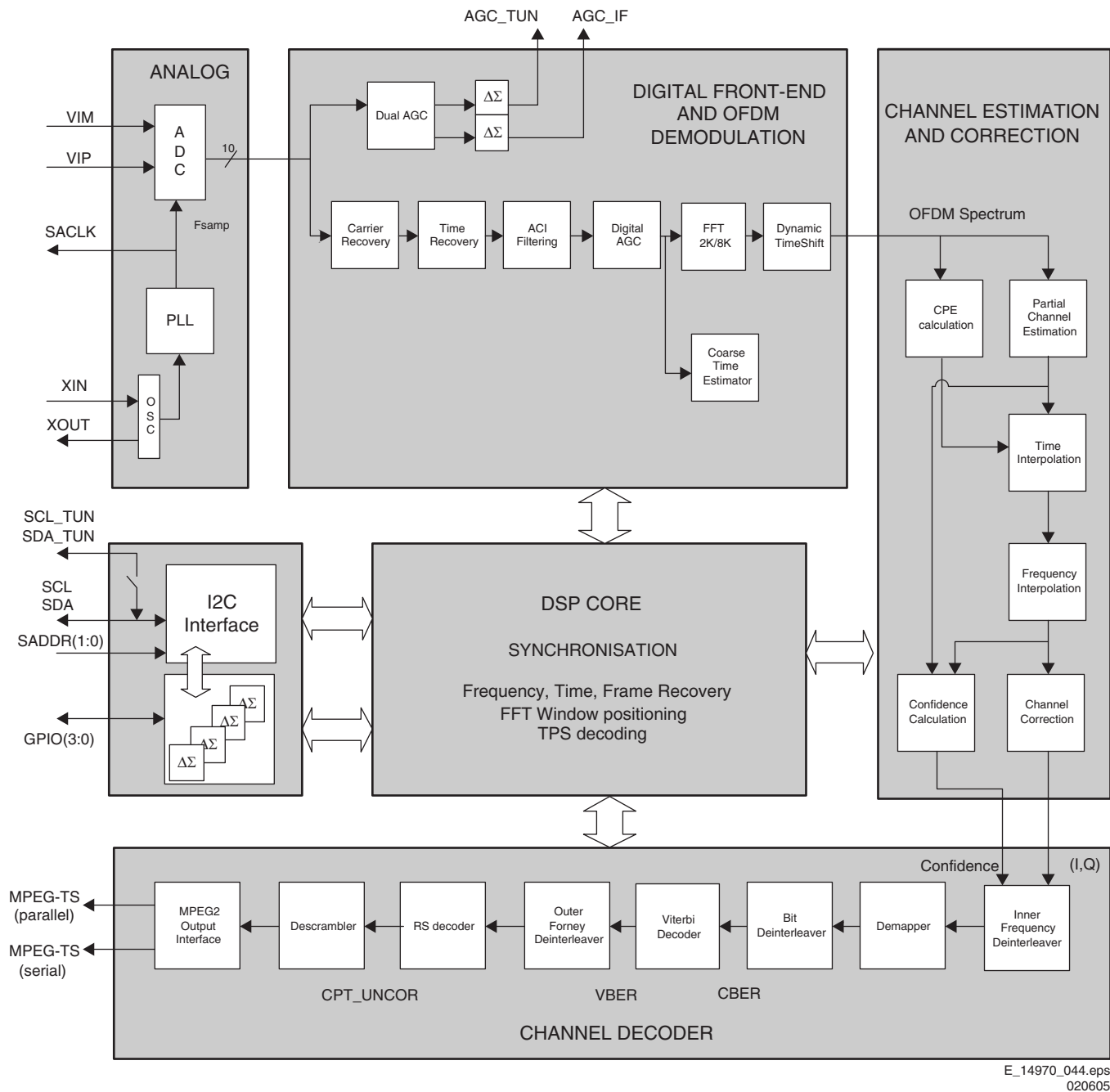


Figure 9-3 Internal blockdiagram TDA10046

10. Spare Parts List

IBO Panel [K]

Various

| | | |
|------|----------------|---------------------|
| 1301 | 2422 025 10768 | Connector 3p m |
| 1304 | 4822 252 51187 | 19398E1(0,500A) |
| 1401 | 4822 267 31729 | Connector cinch 1p |
| 1402 | 4822 267 10459 | Connector 3p |
| 1500 | 2422 025 18872 | Connector 32p f |
| 1600 | 3112 297 13381 | Tuner TD1316/SPHP |
| 1700 | 2422 033 00364 | Connector smartcard |



| | | |
|------|----------------|--------------------|
| 2100 | 4822 124 23002 | 10µF 16V |
| 2101 | 4822 124 23002 | 10µF 16V |
| 2102 | 4822 124 23002 | 10µF 16V |
| 2103 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2104 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2105 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2106 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2107 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2108 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2109 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2110 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2111 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2112 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2113 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2114 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2115 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2116 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2119 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2120 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2121 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2130 | 4822 124 23002 | 10µF 16V |
| 2131 | 4822 124 23002 | 10µF 16V |
| 2132 | 4822 124 23002 | 10µF 16V |
| 2133 | 4822 124 23002 | 10µF 16V |
| 2203 | 4822 124 23002 | 10µF 16V |
| 2204 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2206 | 4822 124 23002 | 10µF 16V |
| 2207 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2208 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2209 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2210 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2211 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2212 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2213 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2214 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2300 | 4822 126 13881 | 470pF 5% 50V |
| 2301 | 4822 124 40849 | 330UF 20% 16V |
| 2302 | 4822 124 40207 | 100µF 20% 25V |
| 2304 | 2020 021 91506 | 1000µF 20% 16V |
| 2305 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2306 | 4822 124 40207 | 100µF 20% 25V |
| 2308 | 4822 126 13881 | 470pF 5% 50V |
| 2309 | 4822 124 40849 | 330UF 20% 16V |
| 2311 | 2020 021 91687 | 470µF 20% 16V |
| 2313 | 4822 126 13881 | 470pF 5% 50V |
| 2314 | 3198 017 33330 | 33nF 20% 16V 0603 |
| 2315 | 4822 124 40849 | 330UF 20% 16V |
| 2317 | 4822 124 40207 | 100µF 20% 25V |
| 2318 | 2020 021 91687 | 470µF 20% 16V |
| 2319 | 2020 021 91634 | 100µF 25V |
| 2320 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2324 | 3198 017 44740 | 470nF 10V 0603 |
| 2325 | 3198 017 44740 | 470nF 10V 0603 |
| 2326 | 3198 017 44740 | 470nF 10V 0603 |
| 2327 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2328 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2329 | 4822 126 13193 | 4.7nF 10% 63V |
| 2331 | 4822 126 13193 | 4.7nF 10% 63V |
| 2332 | 4822 124 40207 | 100µF 20% 25V |
| 2333 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2334 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2335 | 4822 124 12095 | 100µF 20% 16V |
| 2336 | 4822 126 13193 | 4.7nF 10% 63V |
| 2337 | 4822 124 22652 | 2.2µF 20% 50V |
| 2411 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2412 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2413 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2500 | 3198 017 41050 | 1µF 10V 0603 |
| 2501 | 2020 552 94427 | 100pF 5% 50V |
| 2502 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2503 | 2020 552 94427 | 100pF 5% 50V |
| 2504 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2505 | 3198 017 41050 | 1µF 10V 0603 |
| 2506 | 4822 124 12084 | 1µF 20% 50V |

| | | |
|------|----------------|--------------------|
| 2507 | 4822 126 13193 | 4.7nF 10% 63V |
| 2508 | 3198 017 41050 | 1µF 10V 0603 |
| 2509 | 2020 552 94427 | 100pF 5% 50V |
| 2510 | 2020 552 94427 | 100pF 5% 50V |
| 2511 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2512 | 4822 124 80151 | 47µF 16V |
| 2513 | 3198 017 41050 | 1µF 10V 0603 |
| 2514 | 4822 124 12084 | 1µF 20% 50V |
| 2515 | 4822 126 13193 | 4.7nF 10% 63V |
| 2520 | 4822 122 33761 | 22pF 5% 50V |
| 2521 | 4822 122 33761 | 22pF 5% 50V |
| 2522 | 4822 126 14315 | 390pF 5% 50V 0603 |
| 2523 | 4822 126 14315 | 390pF 5% 50V 0603 |
| 2524 | 4822 122 33761 | 22pF 5% 50V |
| 2525 | 4822 126 14315 | 390pF 5% 50V 0603 |
| 2526 | 4822 126 14315 | 390pF 5% 50V 0603 |
| 2527 | 4822 122 33761 | 22pF 5% 50V |
| 2528 | 4822 122 33761 | 22pF 5% 50V |
| 2529 | 4822 122 33761 | 22pF 5% 50V |
| 2530 | 4822 126 14315 | 390pF 5% 50V 0603 |
| 2531 | 4822 126 14315 | 390pF 5% 50V 0603 |
| 2532 | 4822 122 33761 | 22pF 5% 50V |
| 2533 | 4822 122 33761 | 22pF 5% 50V |
| 2534 | 4822 122 33761 | 22pF 5% 50V |
| 2535 | 4822 122 33761 | 22pF 5% 50V |
| 2536 | 4822 122 33761 | 22pF 5% 50V |
| 2537 | 4822 126 14315 | 390pF 5% 50V 0603 |
| 2538 | 4822 126 14315 | 390pF 5% 50V 0603 |
| 2539 | 4822 126 13879 | 220nF +80-20% 16V |
| 2540 | 4822 126 13879 | 220nF +80-20% 16V |
| 2543 | 4822 124 80151 | 47µF 16V |
| 2544 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2550 | 3198 017 42240 | 220nF 16V Y5V 0603 |
| 2551 | 3198 017 41050 | 1µF 10V 0603 |
| 2553 | 3198 017 42240 | 220nF 16V Y5V 0603 |
| 2554 | 3198 017 41050 | 1µF 10V 0603 |
| 2555 | 4822 124 23002 | 10µF 16V |
| 2556 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2557 | 4822 124 23002 | 10µF 16V |
| 2558 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2607 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2608 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2609 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2610 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2611 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2612 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2613 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2614 | 4822 124 80151 | 47µF 16V |
| 2615 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2617 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2618 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2619 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2620 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2621 | 4822 124 80151 | 47µF 16V |
| 2622 | 4822 124 80151 | 47µF 16V |
| 2623 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2624 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2625 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2626 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2627 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2628 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2629 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2630 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2631 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2632 | 4822 122 33741 | 10pF 10% 50V |
| 2700 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2701 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2702 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2703 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2704 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2705 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2706 | 4822 124 23002 | 10µF 16V |
| 2707 | 4822 124 23002 | 10µF 16V |
| 2708 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2709 | 4822 124 23002 | 10µF 16V |
| 2710 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2711 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2712 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2713 | 4822 124 23002 | 10µF 16V |
| 2714 | 5322 126 11578 | 1nF 10% 50V 0603 |
| 2715 | 2020 552 94427 | 100pF 5% 50V |



| | | |
|------|----------------|----------------|
| 3100 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3101 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3112 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3116 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3117 | 4822 051 30103 | 10kΩ 5% 0.062W |

| | | |
|------|----------------|----------------------|
| 3119 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3128 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3130 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3131 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3133 | 9965 000 23109 | 22Ω 5% 0603 |
| 3134 | 9965 000 23109 | 22Ω 5% 0603 |
| 3135 | 9965 000 23109 | 22Ω 5% 0603 |
| 3137 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3138 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3139 | 4822 051 30339 | 33Ω 5% 0.062W |
| 3140 | 5322 117 13036 | 1.2kΩ 1% 0.063W 0603 |
| 3141 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3142 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3143 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3144 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3146 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3147 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3151 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3154 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3156 | 3198 031 13390 | 4X 33Ω 5% 1206 |
| 3157 | 3198 031 13390 | 4X 33Ω 5% 1206 |
| 3158 | 3198 031 13390 | 4X 33Ω 5% 1206 |
| 3159 | 3198 031 13390 | 4X 33Ω 5% 1206 |
| 3160 | 4822 051 30339 | 33Ω 5% 0.062W |
| 3161 | 4822 051 30339 | 33Ω 5% 0.062W |
| 3162 | 4822 051 30339 | 33Ω 5% 0.062W |
| 3163 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3200 | 4822 051 30332 | 3.3Ω 5% 0.062W |
| 3205 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3206 | 4822 051 30332 | 3.3Ω 5% 0.062W |
| 3207 | 4822 051 30332 | 3.3Ω 5% 0.062W |
| 3209 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3210 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3211 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3300 | 3198 021 31080 | 1Ω 5% 0603 |
| 3301 | 3198 021 31080 | 1Ω 5% 0603 |
| 3303 | 3198 021 31080 | 1Ω 5% 0603 |
| 3304 | 5322 117 13046 | 1.8kΩ 1% 0.063W 0603 |
| 3306 | 2322 704 61002 | 1kΩ 1% |
| 3307 | 2322 704 61001 | 100Ω 1% 0603 |
| 3312 | 3198 021 31080 | 1Ω 5% 0603 |
| 3313 | 3198 021 31080 | 1Ω 5% 0603 |
| 3314 | 3198 021 31080 | 1Ω 5% 0603 |
| 3315 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3316 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3317 | 2322 704 63302 | 3.3kΩ 1% 0603 |
| 3318 | 3198 021 31080 | 1Ω 5% 0603 |
| 3319 | 3198 021 31080 | 1Ω 5% 0603 |
| 3320 | 3198 021 31080 | 1Ω 5% 0603 |
| 3321 | 3198 021 31080 | 1Ω 5% 0603 |
| 3322 | 5322 117 13042 | 3.9kΩ 1% 0.063W 0603 |
| 3323 | 5322 117 13057 | 820Ω 1% 0.063W 0603 |
| 3324 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3325 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3326 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3327 | 4822 051 30339 | 33Ω 5% 0.062W |
| 3328 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3330 | 3198 021 31820 | 1.8kΩ 5% 0.062W 0603 |
| 3331 | 2322 704 61001 | 100Ω 1% 0603 |
| 3332 | 5322 117 13055 | 75Ω 1% 0.063W 0603 |
| 3333 | 4822 051 30273 | 27kΩ 5% 0.062W |
| 3334 | 4822 051 30333 | 33kΩ 5% 0.062W |
| 3404 | 4822 051 30561 | 560Ω 5% 0.062W |
| 3405 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3406 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3407 | 4822 051 30689 | 68Ω 5% 0.063W 0603 |
| 3411 | 4822 051 30181 | 180Ω 5% 0.062W |
| 3500 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3501 | 4822 117 12968 | 820Ω 5% 0.62W |
| 3502 | 4822 051 30683 | 68kΩ 5% 0.062W |
| 3503 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3504 | 4822 117 13613 | 2.2Ω 5% 0603 |
| 3505 | 4822 117 12968 | 820Ω 5% 0.62W |
| 3506 | 4822 051 30333 | 33kΩ 5% 0.062W |
| 3507 | 4822 051 30152 | 1.5Ω 5% 0.062W |
| 3508 | 4822 117 13613 | 2.2Ω 5% 0603 |
| 3509 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3510 | 4822 051 30683 | 68kΩ 5% 0.062W |
| 3511 | 4822 117 12968 | 820Ω 5% 0.62W |
| 3512 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3513 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3514 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3515 | 4822 051 30333 | 33kΩ 5% 0.062W |
| 3516 | 4822 117 12968 | 820Ω 5% 0.62W |
| 3517 | 4822 051 30152 | 1.5Ω 5% 0.062W |
| 3519 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3520 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3521 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3522 | 4822 051 30759 | 75Ω 5% 0.062W |

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| 3523 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3526 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3527 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3528▲ | 5322 117 11726 | 10Ω 5% |
| 3530 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3532 | 4822 051 30561 | 560Ω 5% 0.062W |
| 3533 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3534 | 4822 117 12891 | 220kΩ 1% |
| 3535 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3537 | 4822 117 12891 | 220kΩ 1% |
| 3538 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3539 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3540 | 4822 051 30561 | 560Ω 5% 0.062W |
| 3547 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3548 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3557 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3558 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3559 | 4822 051 30681 | 680Ω 5% 0.062W |
| 3560 | 4822 051 30273 | 27kΩ 5% 0.062W |
| 3561 | 4822 051 30271 | 270Ω 5% 0.062W |
| 3562 | 4822 051 30151 | 150Ω 5% 0.062W |
| 3563 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3564 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3565 | 4822 051 30681 | 680Ω 5% 0.062W |
| 3566 | 4822 051 30273 | 27kΩ 5% 0.062W |
| 3567 | 4822 051 30271 | 270Ω 5% 0.062W |
| 3568 | 4822 051 30151 | 150Ω 5% 0.062W |
| 3570 | 4822 051 30689 | 68Ω 5% 0.063W 0603 |
| 3571 | 4822 051 30151 | 150Ω 5% 0.062W |
| 3572 | 4822 051 30561 | 560Ω 5% 0.062W |
| 3606 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3607 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3608 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3609 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3610 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3612 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3613 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3614 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3615 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3618 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3619 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3621 | 4822 051 30339 | 33Ω 5% 0.062W |
| 3622 | 3198 031 13390 | 4X 33Ω 5% 1206 |
| 3623 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3624 | 3198 031 13390 | 4X 33Ω 5% 1206 |
| 3625 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3626 | 4822 051 30272 | 2.7kΩ 5% 0.062W |
| 3627 | 4822 051 30272 | 2.7kΩ 5% 0.062W |
| 3629 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3630 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3631 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3635 | 4822 051 30339 | 33Ω 5% 0.062W |
| 3636 | 4822 051 30684 | 680kΩ 5% 0.062W |
| 3637 | 4822 117 12891 | 220kΩ 1% |
| 3638 | 4822 051 30331 | 330Ω 5% 0.062W |
| 3639 | 4822 051 30391 | 390Ω 5% 0.062W |
| 3640 | 4822 051 30684 | 680kΩ 5% 0.062W |
| 3641 | 4822 117 12891 | 220kΩ 1% |
| 3642 | 4822 051 30331 | 330Ω 5% 0.062W |
| 3643 | 4822 051 30331 | 330Ω 5% 0.062W |
| 3644 | 3198 031 13390 | 4X 33Ω 5% 1206 |
| 3645 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3700 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3701 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3702 | 3198 031 13390 | 4X 33Ω 5% 1206 |
| 3703 | 3198 031 13390 | 4X 33Ω 5% 1206 |
| 3704 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3705 | 3198 031 13390 | 4X 33Ω 5% 1206 |
| 3707 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3708 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3709 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3710 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3711 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3712 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3713 | 2322 704 62002 | 2kΩ 1% |
| 3715 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3716 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3717 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3718 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3719 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3720 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3721 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3722 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3723 | 3198 031 13390 | 4X 33Ω 5% 1206 |
| 3724 | 3198 031 13390 | 4X 33Ω 5% 1206 |
| 3725 | 4822 051 30339 | 33Ω 5% 0.062W |
| 3726 | 4822 051 30339 | 33Ω 5% 0.062W |
| 3727 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3728 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3729 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3730 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3731 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3732 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3733 | 4822 051 30479 | 47Ω 5% 0.062W |

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| 3734 | 4822 117 13573 | 4 x 47Ω 5% |
| 3738 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3739 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3740 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3741 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3742 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3743 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3744 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3745 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3746 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3747 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3748 | 4822 051 30479 | 47Ω 5% 0.062W |
| 3749 | 4822 051 30339 | 33Ω 5% 0.062W |
| 3750 | 4822 051 30339 | 33Ω 5% 0.062W |
| 3751 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3752 | 4822 051 30472 | 4.7Ω 5% 0.062W |



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|------|----------------|--------------------|
| 5100 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5101 | 4822 157 11717 | Bead 50Ω at 100MHz |
| 5102 | 4822 157 11717 | Bead 50Ω at 100MHz |
| 5103 | 4822 157 11717 | Bead 50Ω at 100MHz |
| 5201 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5202 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5203 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5300 | 2422 536 00491 | 47μ |
| 5301 | 4822 157 10452 | 10μH 10% |
| 5302 | 2422 535 94639 | 10μH 20% |
| 5303 | 2422 536 00548 | 100μ |
| 5304 | 4822 157 10452 | 10μH 10% |
| 5305 | 2422 536 00548 | 100μ |
| 5306 | 4822 157 10452 | 10μH 10% |
| 5309 | 3198 018 90050 | Bead 1kΩ at 100MHz |
| 5401 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5502 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5504 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5505 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5507 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5508 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5511 | 3198 018 52280 | 2.2μF 10% 1008 |
| 5512 | 3198 018 52280 | 2.2μF 10% 1008 |
| 5513 | 3198 018 52280 | 2.2μF 10% 1008 |
| 5514 | 3198 018 52280 | 2.2μF 10% 1008 |
| 5528 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5600 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5601 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5602 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5700 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5701 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5702 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5703 | 4822 157 11499 | Bead 60Ω at 100MHz |
| 5704 | 4822 157 11499 | Bead 60Ω at 100MHz |



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| 6300 | 9322 128 70685 | SMSS14 |
| 6303 | 9322 128 70685 | SMSS14 |
| 6304 | 9322 128 70685 | SMSS14 |
| 6307 | 9965 000 20150 | 1N4148WS SOD-323 |
| 6400 | 9340 548 52115 | PDZ5.1B |
| 6401 | 4822 130 10837 | UDZS8.2B |
| 6403 | 4822 130 10837 | UDZS8.2B |
| 6503 | 4822 130 11397 | BAS316 |
| 6504 | 4822 130 11397 | BAS316 |



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| 7100 | 9352 744 74557 | PNX8316HS/C102 |
| 7200 | 9322 206 20668 | M29W320DT70N6F |
| 7202 | 9322 213 88668 | K4S281632F-TC60 |
| 7203 | 9322 130 41668 | M24C64-WMN6 |
| 7300 | 4822 209 60059 | MC34063AP1 |
| 7301 | 9322 184 19687 | LD1117V18 |
| 7302 | 9322 216 98687 | LD1117V |
| 7303 | 4822 209 60059 | MC34063AP1 |
| 7305 | 4822 209 60059 | MC34063AP1 |
| 7306 | 9322 165 15685 | NCP303LSN30 |
| 7307 | 9322 202 15687 | LD1117V50 |
| 7308 | 9322 202 15687 | LD1117V50 |
| 7309 | 4822 130 60373 | BC856B |
| 7310 | 3198 010 70510 | TL431CZ |
| 7311 | 9322 214 70685 | SI2314EDS-E3 |
| 7312 | 5322 130 60159 | BC846B |
| 7402 | 5322 130 60159 | BC846B |
| 7500 | 4822 130 60373 | BC856B |
| 7501 | 5322 130 60159 | BC846B |
| 7502 | 9352 668 39118 | UDA1334ATS/N2 |
| 7503 | 4822 130 60373 | BC856B |
| 7504 | 5322 130 60159 | BC846B |
| 7505 | 5322 130 60159 | BC846B |
| 7506 | 5322 130 60159 | BC846B |

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| 7507 | 5322 130 60159 | BC846B |
| 7510 | 5322 130 60159 | BC846B |
| 7511 | 4822 130 60373 | BC856B |
| 7512 | 5322 130 60159 | BC846B |
| 7513 | 4822 130 60373 | BC856B |
| 7514 | 5322 130 60159 | BC846B |
| 7600 | 9352 732 45557 | TDA10046AHT/C1 |
| 7601 | 5322 209 70225 | LM393D |
| 7605 | 9352 630 16165 | 74AHC1GU04GW |
| 7606 | 9352 630 16165 | 74AHC1GU04GW |
| 7700 | 9322 227 91671 | STV0700L |
| 7701 | 9352 190 10118 | 74LVC573ADB |
| 7702 | 9352 190 10118 | 74LVC573ADB |
| 7703 | 9352 115 40118 | 74LVC245APW |
| 7704 | 2722 171 00207 | Xtal 27MHZ 50P |
| 7705 | 9322 175 13668 | ST890CD |

IBO PSU Panel 42" [KS]

Various

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| 1100▲ | 2422 086 00663 | Fuse 1A T 250V |
| 1M05 | 2422 025 16374 | Connector 2p m |
| 1M30 | 2422 025 10768 | Connector 3p m |



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|------|----------------|--------------------|
| 2101 | 4822 121 51598 | 2.2nF 5% 400V |
| 2102 | 4822 124 40207 | 100μF 20% 25V |
| 2103 | 2020 552 94427 | 100pF 5% 50V |
| 2105 | 2020 552 94427 | 100pF 5% 50V |
| 2108 | 2020 024 00008 | 22μF 20% 450V |
| 2109 | 2022 552 05679 | 1μF 10% 16V 0805 |
| 2110 | 2022 552 05679 | 1μF 10% 16V 0805 |
| 2112 | 4822 126 13883 | 220pF 5% 50V |
| 2113 | 4822 126 11785 | 47pF 5% 50V 0603 |
| 2118 | 4822 124 80061 | 1000μF 20% 25V |
| 2123 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2124 | 4822 124 40248 | 10μF 20% 63V |
| 2144 | 2022 552 05679 | 1μF 10% 16V 0805 |
| 2145 | 4822 126 13883 | 220pF 5% 50V |
| 2149 | 2022 552 05679 | 1μF 10% 16V 0805 |
| 2152 | 4822 121 70162 | 10nF 5% 400V |
| 2153 | 5322 126 11582 | 6.8nF 10% 63V |
| 2159 | 4822 126 13881 | 470pF 5% 50V |
| 2162 | 4822 126 13881 | 470pF 5% 50V |
| 2163 | 4822 124 40207 | 100μF 20% 25V |
| 2510 | 3198 037 31010 | 100μF 20% 25V |



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| 3101 | 4822 053 20225 | 2.2MΩ 5% 0.25W |
| 3102 | 2322 762 60122 | 1.2kΩ 5% 2512 |
| 3103 | 2322 762 60122 | 1.2kΩ 5% 2512 |
| 3104 | 4822 117 12971 | 15Ω 5% 0603 0.62W |
| 3106 | 4822 051 30391 | 390Ω 5% 0.062W |
| 3107 | 4822 051 30391 | 390Ω 5% 0.062W |
| 3108 | 2322 193 14158 | 1.5Ω 5% |
| 3109 | 4822 051 30391 | 390Ω 5% 0.062W |
| 3110 | 4822 051 30391 | 390Ω 5% 0.062W |
| 3111 | 3198 012 21520 | 1.5kΩ 5% 2W |
| 3112 | 4822 051 30391 | 390Ω 5% 0.062W |
| 3114 | 4822 051 30221 | 220Ω 5% 0.062W |
| 3117 | 3198 039 47090 | 47Ω 1% 0.062W |
| 3121 | 4822 117 13608 | 4.7Ω 5% 0603 0.62W |
| 3123 | 4822 051 30109 | 10Ω 5% 0.062W |
| 3124 | 4822 051 30339 | 33Ω 5% 0.062W |
| 3125 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3127 | 4822 051 30222 | 2.2kΩ 5% 0.062W |
| 3128 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3129 | 4822 051 30471 | 47Ω 5% 0.062W |
| 3130▲ | 4822 052 10478 | 4.7Ω 5% 0.33W |
| 3137 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3138 | 4822 051 30334 | 330kΩ 5% 0.062W |
| 3145 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3146 | 4822 051 30479 | 47Ω 5% |

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| 5105 | 4822 526 10704 | Bead 50 Ω at 100MHz |
| 5106 | 4822 526 10704 | Bead 50 Ω at 100MHz |
| 5108 | 4822 526 10704 | Bead 50 Ω at 100MHz |
| 5112 | 4822 157 11411 | Bead 80 Ω at 100MHz |
| 5115 | 4822 157 11737 | 22 μ H 10% |
| 5500▲ | 2422 531 00095 | BS25505-00 B |
| 5504 | 4822 157 11869 | 33 μ H 10% |



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| 6103 | 5322 130 31938 | BYV27-200 |
| 6104 | 9340 548 69115 | PDZ27B |
| 6106 | 9340 548 67115 | PDZ22B |
| 6108 | 4822 130 80622 | BAT54 |
| 6109 | 4822 130 11522 | UDZ15B |
| 6112 | 9322 202 75687 | BYW29FP-200 |
| 6114 | 5322 130 31938 | BYV27-200 |
| 6116 | 3198 020 55680 | BZX384-C5V6 |
| 6117 | 9340 548 71115 | PDZ33B |
| 6118 | 9340 548 71115 | PDZ33B |
| 6120 | 4822 130 11397 | BAS316 |
| 6121 | 4822 130 11397 | BAS316 |
| 6122 | 9322 129 34685 | BZM55-C3V9 |
| 6123 | 4822 130 11416 | PDZ6.8B |
| 6142 | 4822 130 80622 | BAT54 |
| 6144 | 4822 130 11397 | BAS316 |
| 6147 | 9322 208 44685 | BZG05C6V8 |
| 6150 | 4822 130 11522 | UDZ15B |



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| 7100 | 3198 010 42320 | BC857BW |
| 7101 | 9340 219 30115 | BC817-25W |
| 7102 | 9322 201 83687 | FQPF6N60 |
| 7105 | 3198 010 42320 | BC857BW |
| 7501▲ | 9322 149 04682 | TCET1102 |

11. Revision List

Manual xxxx xxx xxxx.0

- First release.